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WILDLIFE REVIEW

AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
ISSUED FOR THE INFORMATION OF COOPERATORS
BY THE
BUREAU OF BIOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF AGRICULTURE

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FOREWORD

WILDLIFE REVIEW is established for the benefit of employes and cooperators of the Biological Survey. Its primary purpose is to abstract articles bearing on wildlife management. As it is impracticable to provide abstracts in such detail that they will serve as substitutes for the originals, an address will be given in each case from which the article, the periodical or other work in which it appeared, or possibly a reprint, may be obtained. Secondarily, brief informative sketches, bibliographies, and other useful features that fall within the limitations of a Federal mimeographed leaflet, will be presented.

The aim is to cover the field of wildlife management in a comprehensive manner. Because of some uncertainties and shortage of time connected with the first issue, however, the abstracts here given are not fully representative. Suggestions as to topics to be covered and as to other ways in which WILDLIFE REVIEW can be made more helpful will at all times be welcome. Contributions of papers for abstracting, especially of those appearing in separate form, or in the less familiar periodicals are invited. All communications should be addressed to WILDLIFE REVIEW, Biological Survey, U. S. Department of Agriculture, Washington, D. C.

It is intended to abstract all pertinent papers appearing from 1935 on and eventually to list the more important of previous publications. No regularity of issue is promised but the REVIEW will appear from time to time as the material on hand warrants. The distinctive heading will identify the leaflet, and the issues will be consecutively numbered, so that the completeness of sets can be checked.

Until further announcement, WILDLIFE REVIEW will be conducted by W. L. McAtee, principal biologist and technical adviser, Office of the Chief.

Washington, D. C. No. 1 September, 1935

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ABSTRACTS

Conservation

Ashbrook, Frank G. Fur scarcity through overtrapping impends; conservation needed, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 218-220.

The annual catch; fur decrease causing apprehension; need for protecting the breeding stock.

Conservation

Connery, Robert H. Governmental problems in wildlife conservation (Columbia University Press, New York, N. Y., $3.25 a copy), 1935, 250 pp.

The changing place of wildlife in the national economy; the sphere of the federal, and of the state, governments in wildlife conservation; the organization and functions of the Biological Survey, the Bureau of Fisheries, and of the State conservation departments; proposals for reorganization of federal conservation agencies; problems of game law enforcement; conclusions and recommendations. The author believes in use with replacement. "There must be a new deal for the wildlife of America if the Nation is to save even a small part of this valuable natural resource." In a single phrase the greatest problem of conservation is how to protect the rights of the many against the greed of the few. Bibliography, 2 pages of which list books, 5, government reports, 1, articles and proceedings, 3, legislative enactments and executive orders, and 2, legal cases and opinions.

Conservation

Van Cleave, Harley J. Man meddles with nature, Scientific Monthly (The Science Press, Lancaster, Pa., 50 cents a copy) 40(4), April 1935, pp. 339-348.

Exploitation of American wildlife; changes due to alteration of environment; inefficiency of protecting and restocking activities; need of intelligent understanding before action. "No program of conservation can ever attain the full measure of its ends until complete recognition is given to the body of underlying scientific facts which elevate conservation from the ranks of the political system."

Conservation

Whipple, Gurth. A history of half a century of the management of the natural resources of the Empire State, 1885-1935 (Conservation Department, Albany, N. Y.), 1935, 199 pp., 14 Pls. (photos).

Contains sections on wildlife, restoration activities, game propagation, and game management as well as historical information on about all phases of conservation in New York State.

Cycles: Sun rhythms

Abbot, C. G. Solar radiation and weather studies, Smiths. Misc. Coll. (Smithsonian Institution, Washington, D. C.) 94(10), August 15, 1935, 89 pp., 3 Pls., 38 figs., 13 tables.

This contains the basic data on periodicity in solar phenomena that the serious student of cycles in wildlife populations must have. In briefest form the findings are that solar variation comprises 12 or more regular

periodicities, all integral submultiples of 23 years. The same periodicities occur in weather and the inference is that solar changes influence weather. Various phenomena depending on weather show the influence of the 23-year cycle, including in biology, widths of tree rings and abundance of cod and mackerel.

Cycles: Wildlife and Solar rhythms

Wing, Leonard W. Wildlife cycles in relation to the sun, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 345-363, 20 figs.

Review of literature of which a bibliography of about 50 titles is presented. Points out cyclic nature of bird migration phenomena, and of variations in population of a variety of organisms and their good synchronization with phases of the sun. "The sun is the dominating factor in wildlife." The word "discovery" in the foreword by Leopold seems unjustified. One misses citation to the extensive studies of cyclic phenomena by Elton.

Disease

Allen, A. A. and P. P. Levine. A brief study of the willow ptarmigan and its relation to predators and the leucocytozoon disease, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 381-386.

Notes on studies in the Hudson Bay region; Leucocytozoon identified from ptarmigan; notes on parasites, predators, and cycles.

Disease

Cameron, Thomas W. M. Animal parasites and wildlife, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 412-417.

General discussion; confinement favors parasitism; methods of collection; possibility of control.

Disease

Clarke, C. H. D. The dying-off of ruffed grouse, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 402-405.

In Canada the die-off begins in the maritime provinces and from there progresses southward and westward. Chick mortality a great factor in decrease and this presumably due to a blood parasite, Leucocytozoon bonasae; available information on latter given.

Disease

Day, Albert M. and J. E. Shillinger. Predators and rodents are factors in the spread of disease, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 284-286.

Discussion of mammals in relation to tularemia, spotted fever, typhus fever, rabies, and bubonic plague, and role of the Biological Survey in control campaigns.

Disease

Frick, E. J. Diseases of wildlife, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(1), January 1935, p. 7.

General sketch; no remedies mentioned.

Disease

Green, R. G. and J. E. Shillinger. Progress report of wildlife disease studies for 1934, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 397-401.

Tularemia in relation to gray foxes and snowshoe hares; losses by age classes in hares; relationship of ticks to tularemia (Minnesota).

Disease

Jones, E. R. Diseases of game birds, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(3), March 1935, pp. 4-5, 10.

Captive birds; lists groups, the diseases identified in them at the Poultry Pathological Laboratory of the California State Department of Agriculture, Los Angeles, and gives suggestions for treatment and control.

Disease

Kalmbach, E. R. Botulism is a factor in the decrease of western wildfowl, U. S. Department of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 140-143, fig. 10 (photo).

Resume of losses; statement of distribution of the disease, sketch of the discovery of the cause, and suggested methods of combatting the malady.

Disease

Morley, R. C. Recent observations on game farm losses, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 232-237.

Discussion of blackhead, ulcerative enteritis (quail disease), and snuffles on game farms, and their control.

Disease

Saunders, G. B. Michigan's studies of sharp-tailed grouse, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 342-344.

Notes on the beginning of an investigation mostly on parasites, Leucocytozoon in the blood and Oxyspirura in the eyes.

Disease

Shillinger, J. E. Diagnosing disease in game, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 418-424.

Suggestions for recognizing diseases, for making autopsies, and for collecting, labelling, and shipping specimens.

Disease

Swales, W. E. Researches on liver fluke in deer, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 406-411.

Fascioloides magna: Intermediate hosts; life history; a normal parasite of deer, fatal only in heavy infestations; control. Bibliography of 5 titles.

Ecology: Animal relations to soils

Taylor, Walter P. Some animal relations to soils, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy) 16(2), April 1935, pp. 127-136.

Animal reactions on the environment, particularly the soil through accumulations of animal bodies or parts, materials for shelters, and stored food materials; soil packing; soil working; dam building and flooding, and promotion of, and prevention of, erosion. Bibliography.

Ecology: Beaver-trout relationships

Salyer, J. C. Preliminary report on the beaver-trout investigation, American Game (American Game Association, Investment Bldg., Washington, D.C., 25 cents a copy) 24(1), January-February 1935, pp. 6, 13-15; 1 photo.

Account of methods used in the investigation in Michigan; summary of research findings; suggestions for beaver-trout management.

Ecology: Carrying capacity determination

Stoddart, L. A. Range capacity determination, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy) 16(3), July 1935, pp. 531-533, 1 fig.

Utilization determined by counting grazed and ungrazed stalks on quadrats. Capacity then computed from number of animals known to have contributed to the ascertained percentage of utilization. The number of head for optimum use can then be calculated. Whether practicable for wildlife a question, as population must be known for at least one degree of utilization.

Ecology: Drainage operations

Uhler, F. M. and C. Cottam. Mosquito control and its effects on aquatic wildlife, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 291-294, 3 photos.

Protest against unnecessary drainage projects and suggestions for reducing interference with wildlife habitats in tidal marshes.

Ecology: Drainage operations

Vogt, Wm. Mosquito control and wildlife, American Game (American Game Association, Investment Bldg., Washington, D. C., 25 cents a copy) 24(3), May-June 1935, pp. 35, 42-43, 3 photos,

"Do present methods of control injure birdlife? The answer, with some qualifications, is, 'Yes'." Particulars are given relating to Long Island, N. Y. projects and also suggestions as to modification of methods and as to further study of the situation.

Ecology: Effects of drought

Errington, Paul L. The 1934 drought and southern Iowa bobwhite, Iowa Bird Life (Winthrop, Iowa, 15 cents a copy) 5(2), June 1935, pp. 18-20, 1 photo.

"By and large there seemed to be a rough correlation between the 1934 fall quail population and the length and intensity of the drought." Mortality may have been brought about by the drought impairing hatchability of eggs, through lack of dew and other readily available water, and through shortage of food and cover.

Ecology: Environmental changes affecting duck nesting

Bennett, Logan J. A comparison of two Iowa duck nesting seasons, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 277-282.

In 1933 with favorable weather and normal grazing and mowing practices an 86 percent hatch occurred. In 1934 with drought, flooding, early mowing and over-pasturing, only a 36 percent hatch resulted. Where cover is adequate losses to natural enemies are small. The majority of nests were found at from 10 to 200 yards of the water. The necessity of protecting nesting areas from grazing, mowing, and burning is urged, and the factors of a satisfactory wild duck breeding environment are listed.

Ecology: Erosion measurement

Weaver, J. E. and Wm. Noll. Measurement of run-off and soil erosion by a single investigator, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy) 16(1), January 1935, pp. 1-12, 3 figs., 4 tables.

Construction and use of interceptometer. Conclusions significant for wildlife management; "run-off without erosion may occur on land with a stabilized plant cover; x x x erosion usually increases with a decrease in plant cover, and is greatest from bared soil x x x; so far as possible men should keep a crop on his cultivated fields at all times."

Ecology: Mapping vegetation

Pearse, Kenneth, Jos. F. Pechanec, and G. D. Pickford. An improved pantograph for mapping vegetation, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy) 16(3), July 1935, pp. 529-530, 1 fig.

Complete specifications and instructions for construction may be obtained from the Intermountain Forest and Range Experiment Station, Ogden, Utah.

Ecology: Shortage of eelgrass

Cottam, Clarence. The eelgrass situation in 1934, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 295-301.

Review of conditions which, though generally improved, were found highly variable. Evidence as to cause of the great failure of eelgrass along our coast and also in European waters seems to point to a fungus disease. The bearing on wildlife management is that shortage of eelgrass was coincident with a great decrease in numbers of brant along the Atlantic Coast. The season for shooting these birds was abolished and can not safely be restored until the eelgrass recovers.

Ecology: Winter-killing of doves

Errington, Paul L. Winter-killing of mourning doves in Central Iowa, Wilson Bul. (Sioux City, Iowa, 60 cents a copy) 47(2), June 1935, pp. 159-160.

Flock with an abundant food supply (hemp) wiped out when heavy snow rendered the feed unavailable.

Education

Cornell University. Announcement of courses in Wildlife conservation and management for 1935-36 (Ithaca, N. Y.), Official Publ. 27(2), July 1935, 20 pp.

Calendar, staff and courses for 1935-36 and suggested four year curriculum, with opportunity for majoring in either ornithology, game-bird propagation, game management, economic zoology and animal ecology, or fisheries.

Food Habits

Martin, A. C. Quail-food plants of the Southeastern States, U. S. Dept. Agriculture Circ. (Supt. of Documents, Washington, D. C., 5 cents a copy) 348, 16 pp. (8 taken up by illustrations), April 1935.

Forty-six groups of plants ranked according to the percentage each contributed to the food of more than 2000 bobwhites from the Southeastern States. Brief notes on distribution, appearance, and food and cover value of the groups, and reproductions of excellent drawings by the author of typical parts, and seeds or fruits, of 28 species or groups of species.

Food Habits: Pheasant

Dalke, Paul D. Food of young pheasants in Michigan, American Game (American Game Association, Investment Bldg., Washington, D.C., 25 cents a copy) 24(3), May-June 1935, pp. 36, 43-46, 3 photos, 2 figs., 6 tables.

Report on crop contents of 138 young pheasants collected in connection with the Williamston Game Management Project in Michigan. Percentages of food items are based on dry weight, the technique of determining which is given. Feeding habits are described and the results of the food analysis presented in tables and graphs. The animal food, 90 percent in the first week, declines to 2 percent at about 10 to 12 weeks of age, being replaced by vegetable matter, chiefly cultivated grains. Variations in insect food according to the place of feeding and the relative importance of systematic groups are discussed as is also the general nature of the vegetable food.

Food Habits: Pheasant

Dalke, Paul D. Dropping analyses as an indication of pheasant food habits, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 387-391, 2 tables.

A report from the Williamston Michigan Game Management Project; methods of collection and study of the material described; important constituents listed and frequency of occurrence (grains, seeds, fruits, herbage, and insects) tabulated by months.

This paper embodies an attack upon the stomach analysis method of studying food habits. First it is said that the method is not "quantitatively significant." Statistically significant is meant as on the following page it is admitted that fecal analyses are "not suited to quantitative determinations." There is room for difference of opinion also on statistical significance; in one case in Biological Survey experience incorporation of data from about 200 stomachs from a single State with those for about 1000 stomachs of the same species from the United States, in general, did not change average results for any principal food group by as much as one percent. All of the other remarks critical of the stomach analysis are faulty for the same reason, namely, that it is not that that method itself is defective but that in case of the birds to which the method of fecal analysis can be applied, material can be obtained in more numerous samples and with greater regularity than it is practicable to collect stomach contents. This is true, however, of only a small proportion of our total number of bird species, so the criticism has no general validity.

Food Habits: Pheasant

Gigstead, Gill. Pheasant crop content report, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N.Y., 20 cents a copy) 39(4), April 1935, pp. 106-107.

Southeastern Wisconsin birds; items found in largest numbers were Spanish thistle, ragweed, hemp, blue bindweed, smartweed, and oats. Thirty-four items in all are listed. No bulk percentages are given and the identifications cited only by vernacular names in some cases may not be translatable into more definite nomenclature.

Food Habits: Relation to wildlife management

McAtee, W. L. Value of research into the food habits of wildlife - an excerpt from "Hearing before the Subcommittee of House Committee on Appropriations, in charge of the Agricultural Department Appropriation Bill for 1936". Reprint of pages 717-737 (obtainable from the Biological Survey, Washington, D. C.).

General statement by the author and quotations as to the value of food habits research from about 25 organizations and individuals, several of the latter class being wildlife managers. Paul L. Errington's contribution was separately published in Science 81 (2103), pp. 378-379, April 19, 1935.

Life Histories: Caribou

Murie, Olaus J. Alaska-Yukon caribou, U. S. Dept. Agr., Bur. Biological Survey N. A. Fauna 54 (Supt. Documents, Washington, D. C., 20 cents a copy), 93 pp., 10 Pls., 16 figs. June 1935.

The caribou in relation to man; status and abundance; limitations on numbers; details of appearance, senses, habits (much on food), distribution and migrations; taxonomy. Full bibliography. A report validated in every part by the great first-hand knowledge of the author.

Life Histories: Ruffed grouse

Bump, Gardiner. Ruffed grouse in New York State during the period of maximum abundance, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 364-369.

Report of progress on the fifth year of the investigation. Food again found not to be a limiting factor. Cover and its character very important; slashings induced nesting in long abandoned wooded areas. Evidence reported of local occurrence of two peaks in the period of a general cycle. Populations as high as a bird to the acre ascertained on a fifty acre tract. Where deliberately thinned out, population promptly restored by immigration and breeding. Predators while destructive have not prevented the birds from increasing up to maximum abundance. Discussion of parasites and possible retarding influence of severe hunting on spread of disease.

Life Histories: Sharp-tailed grouse

Snyder, L. L. A study of the sharp-tailed grouse, University of Toronto Studies (Toronto, Canada), Biol. Series No. 40, 66 pp., 4 Pls., 3 figs., 2 maps, 6 tables. 1935. (Received August 7.)

This paper inspired by the 1932 irruptive migration into southeastern Canada contains much of interest and possibly something of direct value to wildlife managers. The cyclic nature of the sharp-tailed grouse population is recognized, there being quite definitely an approximate 10-year cycle, and apparently also one of "something more than 30 years." The migration is described and mapped, habits briefly noted, and food of 51 winter-collected specimens tabulated. By bulk, catkins, buds, and twigs of birch made up 46.9 percent of the food, being taken by 88 percent of the birds, and fruit and twigs of mountain ash 17.9 percent, being taken by 51 percent of the individuals. Other buds and fruits, with some weed seeds and a trace of insects made up the remainder of the diet. The birds burrow into snow for roosting and lack of snow in cold weather may be one of the serious causes of mortality. Other factors frittering away the southern flight are discussed; the immigrants may survive a few years but not indefinitely south of the "normal" range. Various suggestions are made as to the immediate stimuli to migration, omitting however the "space factor" which may be important. There is a bibliography of 39 titles. A taxonomic discussion not satisfactorily completed in this paper is concluded in Occasional Papers of the Royal Ontario

Museum of Zoology (Toronto, Canada), No. 2, 9 pp., 1 map, 1 table, July 30, 1935, in which five subspecies (one new) plus one provisional, are described and their distribution mapped.

Life Histories: Variations in population, partridge

Middleton, A. D. The population of partridges (Perdix perdix) in 1933 and 1934 in Great Britain, Journ. An. Ecol. (Cambridge University Press, Fetter Lane, London, E. C. 4, England, 22 shillings 6 pence per copy) 4(1), May 1935, pp. 137-145, 5 tables.

After two years of disease and low numbers in 1931 and 1932, there was an increase in 1933 and 1934. The number of breeding birds was more than 35 percent greater in 1934 than in 1933. The number of young reared was, however, slightly less. Taking the gross totals of 42 estates, 53 percent more partridges were killed in 1934 than in 1933.

Management: Burning

Greene, S. W. Relation between winter grass fires and cattle grazing in the longleaf pine belt, Journ. Forestry (Society of American Foresters, 839 Seventeenth St., N. W., Washington, D. C., 65 cents a copy) 33(3), March 1935, pp. 338-341, 2 tables.

The author is Animal Husbandman in charge of the Coastal Plain Experiment Station of the Bureau of Animal Industry at McNeil, Miss. He has long been an intensive student of the interrelations of forestry, fire, and grazing and shows that the average gain of cattle on burned pasture was about 30 percent more than for those on unburned areas. The yield of forage grasses was more than twice as great, and native legumes were twice as abundant on burned as on unburned plots. The nutritive value of the grasses was considerably higher and soil fertility as represented by the proportions of nitrogen and of organic matter notably better on the burned tracts. To those with no previous acquaintance with these studies and especially to those who have had the long-accepted gospel about fire drilled into them, Mr. Greene's findings are amazing. They show, moreover, the necessity of studying all such problems in a thorough, scientific manner, a necessity of which most people interested in wildlife management, fortunately, are aware.

Management: Burning

Maissurow, D. K. Fire as a necessary factor in the perpetuation of white pine, Journ. Forestry (Society of American Foresters, 839 Seventeenth St., N. W., Washington, D. C., 65 cents a copy) 33(4), April 1935, pp. 373-378, 1 table.

A study in Quebec, covering 150 years of uninterrupted development of virgin forest and 80 years during which logging was carried on, showed that practically every stand of white pine can be traced to burns. There is no reproduction under the canopy of the virgin forest and the pine apparently has perpetuated itself through the ages primarily through the medium of forest fires. Even though the findings for the Southeastern States (see the next preceding, and succeeding, abstracts) have received belated recognition

there has been a tendency to restrict their validity entirely to that section. The present paper shows that this is unjustified and may point the way to use of controlled burning by wildlife managers even in the northeastern forests.

Management: Burning

Stoddard, Herbert L. Use of fire on Southeastern game lands, Cooperative Quail Study Association (Sherwood Plantation, Thomasville, Ga.), 19 pp., January 15, 1935. Discussed by Wallace Grange with special reference to application of the findings in Northern States in Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(4), April 1935, pp. 96-97. In the Journal of Forestry (Society of Amer. Foresters, 839 Seventeenth St., N. W., Washington, D. C., 65 cents a copy) 33(3), March 1935, are seven papers on fire in relation to forestry in the Southeast, including that by Stoddard here referred to, and that by Greene abstracted above.

Confirmation by one who has paid more attention to the subject than anyone else of the recommendations as to use of fire in the Southeast that were contained in "The Bobwhite Quail, Its Habits, Preservation, and Increase" (1931). The present brochure is a plea for the carefully controlled periodic use of fire to maintain the proper density and distribution of cover primarily on quail preserves. Methods including mechanical outfits are described and the relation of fire to forestry fully discussed. It was remarkable to observe at the last meeting of the American Forestry Association, Washington, D. C., January 30, 1935, addressed by Stoddard on this subject, how largely the sentiment about the use of fire in the Southeast had changed from the almost unanimously condemnatory position that was taken in the early days of the Cooperative Quail Investigation, that is, about ten years before. This change has largely been due to careful study of the use of fire and conservative advocacy of the findings by Stoddard and the results of investigations (here abstracted) of S. W. Greene of the McNeil, Mississippi Experiment Station which proved that fertility both from a forestry and a grazing standpoint was better on burned than on unburned areas. In a section on the Relation of Burning to Ticks, Chiggers, and Disease, the belief is expressed that fire is beneficial in parasite control. The subject has not, however, been scientifically investigated.

Management: Carrying capacity for bobwhites

Errington, Paul L. Predators and the northern bobwhite, American Forests (Amer. Forestry Assoc., 1713 K St., N. W., Washington, D. C., 35 cents a copy) 41(1), January 1935, pp. 7-10, and 46, 4 photos. Reprinted in The American Field (222 W. Adams St., Chicago, Ill., 15 cents a copy) 124(37), September 14, 1935, pp. 244-246, 4 photos.

The Editor of American Forests says that for three vexed questions of wildlife conservation, (1) Does ordinary predator control do the game any good? (2) Does the shooting of surplus do the game any harm? and (3) Does it do any good to replant game without also improving food and cover conditions?, Errington's findings indicate that the answer is "No". The paper is a popular account of the author's studies on carrying capacity. It notes that surpluses above that capacity for any range disappear regardless of the particular

means through which reduction is accomplished. White man is the only predator efficient enough to reduce bobwhite populations much below the winter carrying capacity of the land; the harvesting of the actual surplus by early-season shooting is biologically sound.

Management: Carrying capacity for bobwhites

Errington, Paul L. What counts in northern bobwhite management, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 370-376.

The definiteness of carrying capacity of different environmental combinations is emphasized. The population of a given area can be only about so many and any surplus is sure to be reduced by one factor or another. Hence predation does not have the importance ordinarily attached to it. Effective northern bobwhite management consists in "(1) raising the normal carrying capacity of the land to a satisfactory level or maintaining it there, (2) strengthening individual coverts to protect against such emergencies as blizzards or sleet storms, and (3) wise regulation of hunting." The most difficult factor to control is the human one.

Management: Carrying capacity for pheasants

Dalke, Paul D. Carrying capacity of pheasant range, American Game (American Game Association, Investment Bldg., Washington, D. C., 25 cents a copy) 24(2), March-April 1935, pp. 23, 31-32, 1 photo.

Habitats were studied by a sampling method, the quantity of food produced estimated in quarts, bushels, and pounds per acre, and using 10.8 ounces of food per week per bird the carrying capacity of waste grains and of weed seeds per section computed for various periods. Fruits were ignored. Consumption of the same foods by other species is recognized but not measured. Food patches are necessary for maintaining the maximum population. This a theoretical rather than a practical study of carrying capacity.

Management: Correlation of land uses

Committee. Report on "Forests and their relation to game management", Journ. Forestry (Society of American Foresters, 839 Seventeenth St., N. W., Washington, D. C., 65 cents a copy) 33(3), March 1935, pp. 273-275.

A brief but meaningful report on coordination of land uses, the theory of multiple use, the problem of isolated ranches, the trend of research and education, and on the need for well digested summaries of scientific findings for popular distribution.

Management: Correlation of land uses

Dutton, Walt L. Wildlife surveys and management plans on National Forest Lands, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 95-101.

Public ownership dictates the policy of multiple use; use without abuse results in correlation of the various interests; land-use policies of the Forest Service; wildlife surveys; research; manipulation of environment; control of gun harvest; diseases; sustained yield.

Management: Correlation of land uses

Frothingham, E. H. et al. Forest improvement measures for the southern Appalachians, U. S. Dept. Agr. Tech. Bul. 476 (Supt. Documents, Washington, D. C., 5 cents a copy), 45 pp., 9 figs. 5 tables and appendix of tables.

This bulletin contributes to an approach between foresters and wildlife managers by including a section (1 page) on "Measures designed to encourage game." It is acknowledged that "stand improvement operations in general will unavoidably reduce the quantity of game food." It is recommended that on better sites from 1-2, and on poorer from 5-10, crop trees per acre be sacrificed so as to leave room for game-food species. Remarks on the value of certain trees and shrubs for wildlife are commendable but classification of the species in the appendix is more illuminating. Shrubs and vines "that sometimes interfere with reproduction of desirable tree species" include alder, blackberry, blueberry, chinquapin, elder, grape, greenbrier, hazel, huckleberry, raspberry, rose, spice bush, striped maple, sumac, viburnum, and Virginia creeper, all valuable in producing food for wildlife. "Weed trees" practically worthless commercially and usually sacrificed in thinning operations include blue beech (Carpinus), pin cherry, crabapple, dogwood, hawthorn, holly, hop hornbeam, magnolia, mountain-ash, mulberry, sassafras, and service-berry, all food trees for wildlife.

The point most frequently at issue between foresters and wildlife managers, namely, as to the necessity of preserving openings and brushy areas, and of breaking up stands by lanes, slashings, or clearings so as to provide the maximum of forest margins, is not mentioned. Dominant canopy of merchantable trees is the forester's ideal (p. 16) but working for that condition means that wildlife can have only incidental and temporary tenure of habitat. With that handicap, wildlife can not be produced and maintained in satisfactory quantity. The reconcilement of forest management and wildlife management has a long way to go for it seems that neither can have what it wants except on a tract where its interests are paramount and its control supreme.

Management: Correlation of land uses

Miller, J. Paul. The correlation of game and forest management in New England, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 309-312, 1 table.

Points out reversion of lands for tax delinquency and possibility of making them productive of income from game and fur animals. Coordination of forest and game management essential; now being experimentally investigated by the Biological Survey and State Department of Forestry in New Hampshire. Notes on winter food of ruffed grouse adapted from Wildlife Research and Management Leaflet (BS-1, January 1935).

Management: Correlation of land uses

Silcox, F. A. Wildlife management and the national forests, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 166-172.

National Forests comprise 75 percent of the big game ranges of the western United States. Game animals increased 100 percent on the forests between 1921 and 1933. Multiple use; improvement of environment; regulation of animal populations to prevent overgrazing; providing maximum wildlife population compatible with other uses of forests; the object of Regulation G-20-A declaring wildlife of the Forests to be under jurisdiction of the Forest Service.

Management: Developing projects

Wight, H. M. The basic essentials for a farm game management survey and plan, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 87-94.

Game management should be an integral part of wildlife management and that an equally essential part of an all-around plan for land use. Reconnaissance of areas; detailed surveys of characteristics; correlation of land uses; preparation of plans for management; cover mapping; wildlife surveys improving environment; counting wildlife. Bibliography.

Management: By Erosion Control Service

Holt, Ernest G. The Soil Erosion Service and wildlife, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 319-325.

Cites destructiveness of soil erosion, outlines aims of the Service, including improvement of environment for wildlife. Reports on a year's operations and results in Coon Valley, Wisconsin, where a 96 percent increase in quail was achieved. Wildlife policies of the Soil Erosion Service stated; no such word as "vermin" in its vocabulary.

Management: Experimental harvesting of bobwhites

Errington, Paul L. and F. N. Hamerstrom, Jr. Bobwhite winter survival on experimentally shot and unshot areas, Iowa State Coll. Journ. Sci. (Collegiate Press, Inc., Iowa State College, Ames, Iowa, $1.00 a copy) 9(4), 1935, pp. 625-639, 3 tables.

Comparison of population survival on 10 shot and 6 unshot areas, that on the former being 10.3 and that on the latter 28.3 percent, respectively, of their quail populations during the period of observation. The data show that reasonable shooting is biologically defensible; it can best be done in early fall when it will take part of the surplus that would not survive the winter anyway. Setting the number to be killed can be satisfactorily done only on the basis of expert appraisal of quail populations in relation to carrying capacity, and it must not be forgotten that due to crippling losses the number brought to bag does not represent the full toll of shooting.

Management: Farmer-sportsman relationships

Beck, Thomas and Arthur L. Clark. Connecticut plan of farmer-sportsman relationship, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 71-73.

Acquisition by the State through proceeds of bond issue of land, and leasing hunting rights to provide public shooting; also agreement with farmers for use of land in return for protection and game management.

Management: Farmer-sportsman relationships

Cowdery, Frank D. One way to replace our game, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(2), February 1935, p. 4, 1 photo.

Supplying seed stock and employing farmers to propagate pheasants; stresses need of sportsman-farmer cooperation.

Management: Farmer-sportsman relationships

Osborne, Lithgow. New York State's approach to the farmer-sportsman's problem, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 68-70.

State posts lands, requires hunters to ask permission to hunt, distributes pheasants and their eggs, provides public hunting grounds.

Management: Farmer-sportsman relationships

Warren, George C. Can free public shooting be continued?, Trans. 21st American Game Conference (American Game Assoc., Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 62-67.

Answers "yes" for New Jersey; farms posted by State partly as refuges, partly as shooting grounds; area stocked; attention given to enemies, food and cover; landholder controls number of hunters; establishment of public hunting areas begun.

Management: Farm game

Sheldon, H. P. Game as a farm crop emphasized by agricultural adjustment, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 220-221.

Reduction of crop acreage gives opportunity for increased game production; possibilities of revenue to farmers; suggestions on improvement of food and cover.

Management: Feed patches

Smith, Lawrence B. The value of coverts and feed patches, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(5), May 1935, pp. 122-123.

General notes on value; buckwheat valuable in some respects but does not furnish winter cover and is not advisable for sowing in mixtures; oats, barley, and sweetclover combination recommended, apparently for the Northeast.

Management: Forest game

Goldman, E. A. Game management and forest protection are related tasks, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 221-223.

Recognition by foresters of the value of wildlife; importance of forests to game; effects of overbrowsing; regulation of game populations.

Management: Iowa's bobwhite plan

Boone, W. C. Iowa's upland game management, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 56-67.

History of project; organization of personnel; 11 questions about bobwhite for which answers based on research are desired; procedure for setting

up and operating game management areas; head of game to be harvested set by game technician; farmers, who may charge reasonable fee, given hunting permit book and tags for the number of birds to be taken; report on one year's experience.

Management: Judging range

Wight, H. M. Evaluating the pheasant range, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 334-341, 3 tables, 12 maps.

Description of important elements of pheasant range, suggestions as to scoring their value, and examples of ratings illustrated by maps (Michigan).

Management: In National Parks

Wright, George M. and Ben H. Thompson. Wildlife management in the National Parks (Supt. of Documents, Washington, D. C., 20 cents a copy) 2, July 1934 (1935), 142 pp., 61 figs. (mostly photos).

Five papers (3 reprinted from The Condor) on perpetuation and utilization of primitive wildlife values; reports on the current status of large mammals in the National Parks, on wildlife restoration in four of the parks (including the elk and trumpeter swan problems of the Yellowstone); on overgrazing as a landscape problem; on research reserves; on buffer areas; and on wildlife management under emergency conservation work. High points: "When the Florida Everglades project is realized, either the visitor will have to bear the discomfort of mosquitoes or leave the swamps to the birds" (p. 6). Barring emergencies "the use of poison is now definitely prohibited within all parks" (p. 6). "The conclusion is undeniable that failure to maintain the natural status of national parks fauna in spite of the presence of large numbers of visitors would also be failure of the whole national parks idea" (p. 13). It was only a few years ago that "the principle of equal protection for all species was established" (p. 15). Hand-feeding and taming of animals to be discouraged; "the city zoo can satisfy this sort of human craving" (p. 23). "Species predatory upon fish shall be allowed to continue in normal numbers and to share normally in the benefits of fish culture" (p. 33). "Wild game prospers more if permitted to remain primitive. The mere presence of man is not so injurious. It is when he attempts to have the animals live his way and die his way that ruin follows" (pp. 36-37). "More of the wild animal background should enter into wildlife administration to the exclusion of ideas rooted in centuries of association with domestic livestock" (p. 38). "We can not stress the value of one animal at the expense of another, for if we do our lopsided vision is reflected in poor management which wrecks the whole organic wilderness" (p. 52). Cougars: "Their absence is responsible for many of our game problems" (p. 71). Wolves: Their "loss is lamentable and there is little likelihood that it can be remedied" (p. 71). "Predators at last have attained equal protection with other forms" (p. 72). Yellowstone elk: Danger to their existence "can be averted at present only by reducing the elk to about half their present number" (p. 87).

Management: New York's Annual Report

Osborne, Lithgow. State of New York Conservation Department, Twenty-fourth Annual Report for the year 1934 (Albany, N. Y.), 1935, 429 pp., illus.

Of interest to wildlife managers is the section (pp. 272-321) devoted to the Bureau of Game. It contains the annual report on: the Ruffed Grouse Investigation (formerly issued in separate form, but not so handled in 1933 and 1934); the breeding cycle of the ruffed grouse and propagation of the species in captivity; experimental work on incubation of the eggs of pheasants and quail; nutrition of growing birds of these species; deer studies (elsewhere abstracted in this issue of WILDLIFE REVIEW); pathological examinations of a great variety of species; effects on alterations in environment of game species; distribution; and take of game; also reports of operations of the State game farms and refuges. Experimental work and application of scientific findings have a gratifyingly large place in the operations of the New York Bureau of Game.

Management: Preserving adequate breeding stock

Preble, Edward A. Waterfowl breeding grounds of Canada, American Game (American Game Association, Investment Bldg., Washington, D. C., 25 cents a copy) 24(2), March-April 1935, pp. 20, 26-27, 2 maps, 1 fig. Essentially the same material is presented also as, Waterfowl breeding grounds of far north now poorly tenanted, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey, pp. 326-328.

Emphasizes destruction of southern breeding areas of waterfowl in contrast to the practically undisturbed condition of the northern area. Describes latter; estimates 85 percent of all our wildfowl are now reared there, while 75 percent of the total killing is done in the United States. Northern areas are not now occupied to capacity, and our duty is to send back a yearly increasing stock so that they will be fully utilized.

Management: Reforestation in relation to wildlife

Edminster, Frank C. The effect of reforestation on game, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 313-318, 2 tables.

Studies on 13 to 16 year old pine plantations and adjoining natural forest growth in eastern New York showed ruffed grouse much more abundant on the natural, and rabbits on the reforested, area in summer. In winter, grouse, rabbits, and deer were in greater abundance on the reforested area and squirrels on the natural. Closer analysis showed that it is only the marginal portion of the reforestation that is used, the interior being barren of wildlife. It is recommended therefore that coniferous plantations be not more than 600 (preferably 400) feet in diameter and that they be separated by plantings of hardwoods and food-bearing shrubs and interspersed by open lands.

Management: Sanctuary values

Pirnie, Miles D. Sanctuary values, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 302-304.

Suggestions apparently resulting from the writer's experience at the Kellogg Sanctuary in Michigan, chiefly as to the location, qualification, and management of waterfowl refuges.

Management: Shooting losses

Moffitt, James. Waterfowl shooting losses indicated by banding returns, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 305-308.

The 12 percent first year, and possible 25 percent aggregate, returns may represent not more than half the banded waterfowl actually killed by hunters. Points out that geese are exposed to 3 or more seasons of shooting before they begin to breed and that the losses are, therefore, more serious than in the case of the earlier maturing wild ducks. Advocates continued intensive banding investigations.

Management: Shooting practices

Cottam, Clarence. Waterfowl problems clarified by study of gunning practices, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 328-330.

Discussion of baiting, repeating guns, decoys, and battery shooting in relation to waterfowl protection.

Management: White-tailed deer, winter foods and feeding

Maynard, L. A., Gardiner Bump, Robert Darrow, and J. C. Woodward. Food preferences and requirements of the white-tailed deer in New York State, New York State Conservation Department (Albany, N. Y.) and New York State College of Agriculture (Ithaca, N. Y.) Joint Bul. No. 1, January 1935, 35 pp., 5 photos, 7 tables. Preliminary report under same title preceded by words "A study of the", by Robert Darrow, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 392-396.

A commendable feature of this investigation was collaboration of experts in animal nutrition with wildlife technicians. The nutritive requirements of animals in the wild were found comparable with those of domestic stock and as there are experts on the nutrition of the latter group available at various Agricultural Experiment Stations, the possibility of carrying on there similar adequate dietary investigations in connection with wildlife problems is distinctly indicated. In the present case winter tests of various foods were made in 1-1/2 acre pens under nearly natural conditions; browse in variety

(white cedar, white and yellow birch, soft maple) and also alfalfa hay were found to maintain the deer with only slight loss of weight. Beaver meadow hay proved unpalatable, regardless of quality, and when fed exclusively resulted in rapid loss of condition. Balsam was found to be a poor, and white cedar a good, type of browse, with hemlock intermediate. A table is given showing the relative preferences of captive deer for various browse species. Water requirements were found so low as to indicate that lack of open water probably is not dangerous in the winter environment so long as snow is available. Various physiological studies of captive deer are reported on, as well as the development of a concentrated food for emergency use in the wild. The product adopted was a 45-55 combination of cane molasses and coarse soybean meal, sealed in tin in 25 pound cakes in which wires for attachment had been incorporated. When exposed in browse to which wild deer were attracted the cakes were well accepted; experiments with captives showed a satisfactory degree of digestibility. A surprising statement is that a clause in the State Constituion prohibits the cutting of even a single tree to prevent starvation - an instance of conservation over-ripe. For experimenters the characteristic inadequacy of single foods needs to be kept in mind and for wildlife feeders the dangers of intensifying parasitic infestations as well as the evils of any degree of domestication of the wild stock. The National Park Service reports in the case of the Yellowstone elk herd that artificial feeding has proved so much more harmful than beneficial that it must be discontinued as soon as possible. (See Fauna of the National Parks, No. 2, also abstracted in this issue of WILDLIFE REVIEW.)

Management: Wildfowl refuge program

Dieffenbach, Rudolph. Waterfowl-restoration program undertaken by the government, U. S. Dept. of Agriculture, Yearbook of Agriculture 1935 (Supt. of Documents, Washington, D. C., $1.00 a copy; separates of the individual article obtainable later from the Biological Survey), pp. 330-331.

Progress of land acquisition campaign and general outline of refuge development program.

Management: Wild turkey

Stoddard, Herbert L. Wild turkey management, Cooperative Quail Study Association (Sherwood Plantation, Thomasville, Ga.), 11 pp., April 8, 1935. Substantially the same account as previously appeared in Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 326-333, in American Game (same address, 25 cents a copy) 24(2), March-April 1935, pp. 22, 29-30, 2 photos, and in Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(6), June 1935, pp. 153-154, 174-175, 1 photo.

This report by the Director of the Cooperative Quail Study Association, according to his statement, is a discussion of "methods of wild turkey management developed through trial and error." Even so it presents more on its subject than has ever been available elsewhere and is correspondingly welcome.

The results summarized are those obtained on "scores of Southeastern game preserves during recent years." Size of area needed; saturation point (apparently not definite as for bobwhite); purity of stock; control of enemies; available information on parasites and diseases; food and cover requirements; planting for wild turkeys; and artificial feeding are the topics covered.

Management: Yellowstone elk

Baggley, George F. Federal Elk Commission report, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 184-187.

Brief account of the Northern Yellowstone Herd, its artificial feeding since 1895, present numbers, necessity for reduction and recommendation of methods.

Propagation: Battery brooding

Petty, Uel N. Battery brooding bobwhite chicks, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 224-225.

Account of experiment with battery brooding which is not recommended for present trial on a large scale, though the author plans to continue experimentation (Oklahoma).

Propagation: Blue grouse

Simpson, Gene. Breeding blue grouse in captivity, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 218-219.

From four pairs 43 eggs were obtained, 33 hatched under bantams and 22 birds were reared to maturity. The rearing coops were kept in a natural environment and much natural food was given.

Propagation: Chukar partridge

Bade, August. Mr. Chukar - now naturalized Californian, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(5), May 1935, pp. 118, 143, 1 photo.

Released in 18 California counties, known to be well established in two; brief notes on artificial propagation; as high as 112 hatchable eggs obtained from a single female in a season; young easily brooded artificially.

Propagation: Chukar partridge

Bentley, B. Howard. "A wonderful bird is the x x x", Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(5), May 1935, pp. 4-5, 11, 1 photo.

Chukar partridge; brief notes on appearance and native home; status in Pacific Coast States; pens; sanitation; propagating methods; care of young; feeding, including formulas for mashes and grain food mixtures; prices.

Propagation: Cottontail

Gerstell, Richard. Pennsylvania's experiments in the propagation of cottontail rabbits, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 226-231.

Experiments with a range system under different environments and with varying proportions of the sexes demonstrated that at best the produce of one doe will not exceed 6 young reared to maturity per season, and that even with supplemental feeding not more than 40 rabbits can be kept on an acre of land over an extended period. The need of a controlled system of propagation is stressed, and further experimentation planned. Losses from predators, diseases, and other causes are briefly discussed.

Propagation: Dates of laying

Denley, Charles F. Dates birds started to lay and averages for four years, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 25 W. State St., Doylestown, Pa., 25 cents a copy) 5(7), July 1935, p. 9.

Relates to captives mostly of the pheasant family, but is an interesting collection of data the like of which is not publicly available elsewhere. Notes on 26 species.

Propagation: Game farm fencing

Anon. Game farm fencing, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(5), May 1935, p. 8.

Suggestions as to posts, gates, material, and erection of fences.

Propagation: Hen foster mothers and their care

Rockwell, M. J. The foster mother, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), Pt. 1, 5(4), April 1935, pp. 8, 10; Pt. 2, 5(5), May 1935, pp. 1, 11; Pt. 3, 5(6), June 1935, p. 1; Pt. 4, 5(7), July 1935, p. 1.

Pt. 1, objections to large breeds and feather-legged varieties; use of bantams, silkies; Pt. 2, freeing prospective brooders from parasites, vices; sites for nests; boxes; number of eggs to a setting; Pt. 3, care of setting hen and nest; Pt. 4, hatching time; early care of young.

Propagation: Mallard

Grange, Wallace. Handling wild mallards in captivity; Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(8), August 1935, pp. 210-211, 1 photo.

Importance of selection, handling in small units rather than in flocks, character of environment, and of training, in preserving wild conformation and reactions.

Propagation: Melanistic mutant pheasant

Jurale, Bernard. The scientific side of mutant breeding, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(8), August 1935, pp. 207, 223, 1 photo.

A discussion of the melanistic mutant of the ringnecked pheasant in the light of Mendel's laws of heredity. Vital statement: "The original mutant was lost, and the birds imported were, without doubt, hybrids because the offspring did not breed true but produced all types of variations, in color, size, etc."

Propagation: Natural versus artificial

Lovejoy, P. S. Natural as against artificial propagation, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 74-83.

Condemns the use of uninformed and wasteful methods; gives due credit to restocking operations but points out disadvantages; and strongly urges working with habitats, ecologies, end environmental controls.

Propagation: Pheasant

Jeffreys, George A. Raising pheasants on wire floors, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(3), March 1935, pp. 66-67, 82.

Description of pens, brooders, brooding and feeding system under conditions requiring that all dietary elements be artificially provided.

Propagation: Pheasant

Young, Mrs. C. P. The California system of propagating the ringneck pheasant, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(9), September 1935, pp. 4-5, and 9-10, 1 photo.

Description of pens, battery setting nests, brooding coops, feeding, and methods of handling in a typical backyard system; also importance of record keeping.

Propagation: Pheasant rearing costs

Callenbach, E. W. and R. R. Murphy. The cost of producing ringneck pheasants, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 204-212, 9 tables.

All costs including initial outlay for day-old chicks, brooder houses, brooders, fencing, food, labor, etc. involved in rearing birds to 28 weeks of age reckoned and distributed according to items and weeks. Formulas are given for 24 and 20 percent protein mashes and for the grain mixture used. The actual cost per bird for the whole period was $1.55 but this figure might not be applicable elsewhere because of local variation in prices; moreover it covers equipment that could be used for years and would serve materially to reduce costs of the second and following years.

Propagation: Prairie chicken

Handley, Chas. O. Raising prairie chickens in captivity, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 220-223.

Account of success in Virginia by W. B. Coleman, the well known quail breeder, in rearing prairie chickens from eggs produced in captivity. Out of 23 eggs obtained from a pair reared in captivity, 16 hatched and 8 birds were raised to maturity. Modern quail rearing equipment was used. Rickets developed in birds fed skimmed milk clabber, but not in those given whole milk clabber. Feeding methods described. In discussion Dan Ramey gave an account of rearing prairie chickens from wild collected eggs at the Kansas State Quail Farm; grasshoppers were found to be an excellent food for the young chicks.

Propagation: Production of pheasant eggs in winter

Martin, Lewis E. Pheasant eggs in winter, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(4), April 1935, p. 95.

Birds kept continuously under light, either daylight or artificial, began laying in January and soon proceeded at the normal rate; discussion of causes of early infertility, later overcome; diet.

Propagation: Ruffed grouse

Bump, Gardiner. Recent developments in the rearing of ruffed grouse, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 213-217, 1 table.

Artificial incubation of the eggs, reversion to the wild of liberated pen-raised birds, and carrying stocks of breeders over winter are regarded as solved problems. Increase in egg production and in fertility of the eggs is highly to be desired, but may be obtainable only through a long process of

selective breeding. Largest number of eggs laid by a captive female in a season, 27. A rather inflexible breeding cycle in males interferes with fertilization under game farm conditions. Keeping the birds on wire is desirable in preventing disease but results in a high proportion of infertile eggs and lower hatchability of fertile eggs.

Propagation: Storing and shipping eggs

Rockwell, M. J. Storing and shipping eggs for hatching, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(4), April 1935, pp. 4-5.

Best storage temperature about 50° F.; discussion of temperatures and humidity; egg cleaning; turning; directions for packing and shipping.

Propagation: Tragopan pheasants

Denley, Charles F. The Tragopan pheasants, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(9), September 1935, p. 5, cover illus.

Notes from his experience on the care of these birds; some infertility of eggs a drawback; 8 to 16 laid per season; pneumonia the most serious malady; suggestions on feeding.

Propagation: Wild turkey standards

Pirnie, M. D. Wild turkey standards, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 260-262.

Discussion of some of the "points" and suggestions for preserving wild conformation and behavior.

Propagation: Winter feeding

Rockwell, M. J. Feeding "greens" in winter, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(1), January 1935, p. 10.

Discussion of value, and use in feeding captive game birds, of dehydrated spinach, alfalfa and alfalfa meal, lettuce, carrots, mangels, and apples.

Propagation: Wood duck

Gorton, G. R. The beautiful Aix sponsa, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy) 5(8), August 1935, pp. 4-5, 1 photo.

A hardy, quiet bird tolerant of other species. Equipment and feeding for small scale rearing (California).

Restocking: Day-old bobwhite planting

Hart, Dennis. Restocking with day-old quail, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 241-245.

Maintenance of suitable refuge and nesting cover is stressed; planting of day-old chicks by the cock-adoption or by the bantam-fostering methods is described (New Jersey).

Restocking: Day-old pheasant chick distribution

Holm, E. R. What the commercial breeder can learn from New York's day-old chick program, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 238-240.

Under pheasant egg distribution one egg in five produced a bird of liberatable age; under day-old chick distribution the proportion is 1 to 2 and is thought susceptible of improvement. The advantages to commercial breeders from whom eggs or chicks are purchased, and the desirability of improving quality of these products is pointed out.

Restocking: Differential for exotics and natives

Ligon, J. Stokley. A new deal for native game, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(6), June 1935, pp. 152, 172-173.

Deplores destruction of environment and introduction of exotic game; suggests as a partial remedy for the existing situation devoting farms and other environment that presumably will remain in an unnatural condition to introduced game, and reserving and safeguarding natural environment for native species.

Restocking: Introduction of wood pigeon

Canfield, George D. The British wood pigeon for America, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(6), June 1935, p. 155.

Arguments for introduction of this species, which are mildly criticized by the editor. The undesirability of introducing this bird in view of its destructive food habits is pointed out by Phoebe Knappen in the following issue (39(7), July 1935, p. 189).

Restocking: Mountain sheep

Grinnell, Joseph. A way to "bring back" the native bighorn to the Yosemite, Sierra Club Bul. (Sierra Club, 402 Mills Bldg., San Francisco, Calif., 75 cents a copy) 20, 1935, pp. 28-31.

Maintain a corridor, free of domestic sheep, continuously from the Mount Humphreys district where bighorns of the proper subspecies are known to persist, along the crest of the Sierras to the Yosemite National Park, and await natural infiltration. Opposes introduction of the Rocky Mountain subspecies.

Restocking: Planting bobwhites

Hart, Dennis. Liberating quail chicks with bantams, Game Breeder and Sportsman (Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y., 20 cents a copy) 39(3), March 1935, pp. 62-63, 76.

Selection, preparation, and planting of covey ranges, and liberation thereon of newly hatched broods in charge of bantams, the latter afterwards caught up; feeds and feeding methods.

Restocking: Survival of planted bobwhites

Handley, Chas. O. The survival of liberated bobwhite quail, Trans. 21st American Game Conference (American Game Association, Investment Bldg., Washington, D. C., 50 cents a copy), 1935, pp. 377-380.

Study of this subject seems very necessary but those who have carried it on feel that the results do not tell the true story of survival. In Virginia during three seasons' work with wild-trapped birds 13.33 percent were trapped approximately one year after their release, and of 237 captivity-reared quail released in 1930, 28.69 percent were retrapped or otherwise accounted for in a period of about three years. Nevertheless the writer thinks that captivity-reared quail are not especially handicapped in comparison to the wild. Returns, says the abstracter, though below expectations, possibly are an approximate indication of survival, for there is a great overturn in bobwhite populations, and habitats simply will not support and hold more than appropriate numbers regardless of how many additional birds may be dumped into them. In this regard see Errington's papers on carrying capacity.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

The Biological Survey has instituted a new series of mimeographed leaflets under the above heading known as the BS Series which in time will replace the previous series known as Bi Information Leaflets. A list of those issued to date that are of interest in connection with wildlife management is given below. Copies of these leaflets can be obtained upon application to the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-1. Winter Food of Ruffed Grouse in New York, by Leon H. Kelso, January 1935, 3 pp.

Tabulation of percentage by bulk of principal items and discussion of their value.

BS-3. The Present Situation Regarding Eelgrass (Zostera marina), by Clarence Cottam, February 1935, 7 pp.

History and extent of eelgrass disappearance, cause of the malady, effects of disappearance, past periods of scarcity, and present conditions.

BS-5. Tularemia, an Animal-borne Disease, by W. B. Bell and J. E. Shillinger, April 1935, 3 pp.

Nature and history of the disease, symptoms in man, symptoms in wild rabbits, and other animals known to be susceptible, protective measures, and quarantine.

BS-9. Infectious Diseases as a Cause of Loss in Wildlife, by J. E. Shillinger, May 1935, 4 pp.

Discussion of diseases, particularly in relation to cyclic fluctuations in animal populations. Bibliography of six titles.

BS-12. The Present Plight of the Jackson Hole Elk, by H. P. Sheldon, Olaus J. Murie, and W. E. Crouch, July 1935, 4 pp., 1 map.

Elk a last remnant of old times, Jackson Hole a recreation area, elk problem is lack of winter range, winter feeding degrades the magnificent elk, temporary measures costly, and permanent solution requires adequate range.

BS-13. Protecting Grain Crops from Damage by Wildfowl, by E. R. Kalmbach, September 1935, 8 pp.

Nature of complaints, obligations of the farmer, obligations of the Federal Government, and suggestions for crop protection.

BS-14. Planting for Wildlife in the Corn Belt, by W. L. McAtee, September 1935, 2 pp.

Suggestions for use of land taken out of corn production, especially in growing plants producing cover and food for wildlife.

BS-15. Planting for Wildlife in the Cotton Belt, by W. L. McAtee, September 1935, 2 pp.

Suggestions for use of land taken out of cotton production, especially in growing plants producing cover and food for wildlife.

BS-16. Bird Refuges and Big-game Preserves Administered by the Bureau of Biological Survey, August 1935, 7 pp., 1 map.

Location, designation, date established, acreage, chief species protected.

BS-17. Wildlife of the Atlantic Coast Salt Marshes, by W. L. McAtee, September 1935, 22 pp.

Zones of salt-marsh plants, plants of the zones and their value to wildlife; birds, and other wildlife.

SPECIAL ARTICLES

Gathering, storing and sowing a typical water plant - sago pondweed

Sago pondweed seeds are most easily gathered and subsequently handled if taken with a few inches of the top of the plant. Clipping these off from a boat is better than raking up masses of the plants and then separating the seeds. The clipped tops should be dropped in receptacles of cool water, and it may be desirable to use ice if they are exposed to heating by the sun for some hours.

Sago pondweed tubers occur both on the upper part of the plant and on the roots. Those growing among the foliage can be treated like seeds. Those on the roots are best gathered in quantity by spading up the soil containing them and carefully washing it in a sieve of about quarter-inch mesh. The tubers recovered should be placed in separate containers in cool water as suggested for seeds.

It is better to handle both seeds and tubers in small receptacles, than in large, to minimize risk of injury. The sprouts of the tubers, for instance, are easily broken. Small receptacles nesting in large containers with a common stock of water are advised and may be assembled as material locally available permits.

Storage should be at temperatures slightly above freezing (32° - 34°). Open-topped containers of wood, glazed earthenware, or other material so lined as to prevent chemical reaction with the water should be used. The seeds and tubers should be kept entirely submerged and, if necessary, loss of water made good from time to time. Artificial cold storage must be resorted to except where there is a long cold winter with temperatures low enough both at the time the material is gathered and again in spring to prevent either fermentation or germination. Where these conditions prevail the planting material can be kept under water and ice in burlap bags.

Material should not be removed from storage until all preparations for planting have been made, and then should be kept wet and cool until actually used. Some method of anchoring planted material should be used either by covering it up in holes in the bottom as in dry land planting, or embedding it in balls of stiff clay, or wrapping it in cheesecloth and weighting with any conveniently accessible objects, as stones, large nails, bolts, or the like.

In shallow water, wading and planting by hand is satisfactory. In deeper places, the prepared balls or bundles of planting material can be dropped from a boat or placed in a hole made with an oar, as convenient. Plant at the very beginning of the growing season, and, if practicable, when the minimum number of waterfowl is present.

Sampling Insect Populations

This subject may seem far afield for the wildlife manager but that is not the case. Dependable knowledge of the insect population of areas gives a basis of judging their comparative values as nurseries for young game birds, a factor of great importance both on the game farm and in connection with restocking operations.

Despite criticisms of the accuracy of the net-sweeping method, it may nevertheless be regarded as a useful indicator of various phases of insect population phenomena. It certainly suffices for rough comparisons of insect abundance on restricted areas. The sweeping should be done under similar conditions and the best way to insure this is to do it in as short a time as practicable on the areas to be compared. An insect net with capacious diameter, say 2 feet, should be used, the sweeps made of the same length, and at about the same height from the ground taking in as much as possible of the vegetation. From 6 to 9 sweeps, each travelling through about 8 feet of the vegetation, will give a good indication of the population.

The insects caught can be concentrated by "slatting" them into a corner of the net, killed by putting that corner in a large cyanide bottle, which should be corked for several minutes. The job can best be done, therefore, by having a separate net for each area to be sampled. (Addresses of dealers in insect nets and cyanide bottles may be obtained from WILDLIFE REVIEW.)

After the insects are quite dead they can be emptied into any handy receptacles and counted at leisure. The counting can be done with any desirable or practicable degree of detail. For wildlife management purposes no special knowledge of insects is required as enumeration of grasshoppers, caterpillars, other insects, and spiders will suffice. Caterpillars and spiders are important food for very young birds, and grasshoppers and miscellaneous insects for those of all stages from about a week on.

Papers which discuss various methods of sampling insect populations including net-sweeping and the statistical validity of the results, and which contain references to further articles are the following:

Gray, Harold E. and Alan E. Treloar. On the enumeration of insect populations by the method of net collection, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy) 14(4), October 1933, pp. 356-367, 1 fig. 6 tables.

Beall, Geoffrey. Study of arthropod populations by the method of sweeping (id.) 16(2), April 1935, pp. 216-225.

WILDLIFE REVIEW

AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
ISSUED FOR THE INFORMATION OF COOPERATORS
BY THE
BUREAU OF BIOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF AGRICULTURE

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Washington, D. C. No. 2 January, 1936

COMMENTS ON WILDLIFE REVIEW

Brickbats (?): Addressed by a few as Wildfire Review, perhaps inadvertently.

Constructive suggestion: An author index in each issue and at end of year. It will be done.

Bouquets: Samples from a large assortment (excluding, however, those from members of the Biological Survey):

"An excellent idea" (or words to that effect). Numerous correspondents.

"Fine, most valuable." S. Prentiss Baldwin, Cleveland, Ohio.

"This is splendid, and much appreciated." Paul J. Fair, Berkeley, California. Similar remark from Miles D. Pirnie, Kellogg Bird Sanctuary, Michigan; P. S. Lovejoy, Ann Arbor, Michigan, and others.

"It's a success." H. M. Wight, School of Forestry and Conservation, Ann Arbor, Michigan.

"It is useful, timely, and very much worth while." E. C. O'Roke, same organization.

"A fine service; congratulations on your first issue." R. B. Hunter, Fish and Game Service, Vermont.

"This is the finest service ever and I heartily congratulate the Bureau upon so helpful and constructive an innovation." James Moffitt, San Francisco, California.

"In my opinion this is an excellent move, and one that fills a long-felt need. It will give added impetus to the wildlife research that the Bureau is sponsoring and to that done elsewhere. Permit me to compliment you on the timeliness of this undertaking." Rudolf Bennitt, Associate Professor of Zoology, University of Missouri.

"I wish to congratulate you on the initiation of a publication which is bound to be of the greatest value to those interested in game conservation and wild life, the country over. One of the great difficulties in following this literature is its scattered nature and the fact that some of it appears in highly technical journals and many articles appear in journals which the technical worker would completely overlook. The publication is bound to have a great influence on the development of the work along these lines." Wm. A. Riley, University of Minnesota, University Farm, St. Paul, Minnesota.

"This is a great contribution and needed." William C. Adams, Conservation Department, Albany, New York.

"Congratulations on your first number of the WILDLIFE REVIEW. This is a swell job!" Seth Gordon, Secretary, American Wildlife Institute.

"I want to shoot along my congratulations on 'The Wildlife Review'. This is something that has long been needed and I think you have done a swell job with your first number. This is a publication that will be extremely useful." William Vogt, Editor of Bird-Lore.

"I am sure that WILDLIFE REVIEW will be a most useful publication to all persons working in the general field of conservation." T. H. Frison, Chief, Natural History Survey, Urbana, Illinois.

"We feel that this publication will be very valuable to those who are working in the field of wildlife management." Arthur L. Clark, Supt., Connecticut State Board of Fisheries and Game.

"This explanatory review concentrates a scattered field of material and saves the men in the field valuable time and energy." Clarence Pautzke, State Biologist, Seattle, Washington.

"This is fine stuff. Of much value to us who are engaged in teaching game and ecological research." W. J. Hamilton, Jr., Cornell University, Ithaca, New York.

"Wildlife Review will be a wonderful help in carrying on work in my two districts." Frank R. Rost, U. S. Forest Service, Virginia, Minnesota.

"The publication will be of much interest and help to the several branch stations under the Southwestern Forest and Range Experiment Station." Arthur Upson, Director, Tucson, Arizona.

"I was delighted to obtain copies of your new publication for distribution among the Forests in this Region and am of the opinion that it is decidedly worth while. Wildlife Review should fill an important place in educating those interested in wildlife management and in keeping them informed concerning recent publications of value from a wildlife management standpoint." R. M. Evans, Regional Forester, Washington, D. C.

"I have examined with much interest the first issue of the REVIEW and feel sure that it will prove most useful to all of us interested in wildlife administration. Your thoughtfulness in making it available to us is greatly appreciated." George M. Wright, Chief, Wildlife Division, National Park Service.

"Let me take this opportunity to express appreciation of the outstanding value of Wildlife Review to all who are concerned with wildlife management. The harassed field man, who usually experiences the greatest difficulty in squeezing surveys of current literature into his program, is going to find the Wildlife Review absolutely indispensable." E. Lowell Sumner, Jr., Regional Wildlife Technician, National Park Service, San Francisco, California.

"Please accept my congratulations on the very excellent publication 'Wildlife Review'. It is perhaps the thing we have needed most in our wildlife work for several years past. Certainly if future copies contain the same amount and kind of information as was contained in the first copy every investigator will find it indispensable." Ralph T. King, Instructor, Economic Zoology, University of Minnesota.

"I received the first copy of Wildlife Review, and think that it should prove to be very useful to the various workers in the field. x x x I like the concise, clear way in which you sum up the significant essentials of each paper and give the reader something of an idea as to contents, in case he wishes to look up the original." Paul L. Errington, Research Asst. Professor, Iowa State College.

"Let me congratulate you on the game management reviews. This will prove most useful to all game managers who desire to keep up to date. In addition to getting the many references, we will enjoy the brief comments, as well as profit by them." Herbert L. Stoddard, Director, Cooperative Quail Study Association, Thomasville, Georgia.

"Wildlife Review is the most significant publication I have received in many months. The Biological Survey is to be congratulated on this contribution to field men working with game. The editor's comments are especially pertinent and should be enlarged, upon occasion, for the gist of his critical examination may be of as much importance as the paper reviewed." Wallace Grange, Baileys Harbor, Wisconsin.

"Issue No. 1 of 'Wildlife Review' has been carefully read from cover to cover, and I can assure you that its appearance has been welcomed with great enthusiasm, not only by myself, but by our entire biological staff. Such a publication is invaluable in keeping our field men, who are widely scattered and generally remote from library facilities, posted on the latest developments in wildlife management. From the very beginning of wildlife activities in the Soil Conservation Service, we have felt the need for a publication devoted exclusively to wildlife management, and, if you recall, I have been urging this very thing for a long time. You may know, therefore, that your service in conducting the 'Wildlife Review' is meeting a very keen need of the Soil Conservation Service and is deeply appreciated." Ernest G. Holt, In Charge, Wildlife Conservation, Washington, D. C.

ABSTRACTS

Biological Survey: Annual Report, 1934-1935

Darling, J. N. Report of the Chief of the Bureau of Biological Survey, 1935 (Biological Survey, Washington, D. C.), 51 pp., 1935.

Account of the work of the Bureau not intended primarily for presentation of detailed findings. Touches upon many things related to wildlife management. Research on big-game mammals, on forest wildlife, waterfowl food resources, food habits, relationships of predators and upland game birds, crow-duck relationship, and diseases are illustrative headings. The refuge program, the big-game preserves, and predator control activities are among other things discussed.

Conservation: Education

U. S. Office of Education. Conservation of natural resources, Outlines of instruction for educational advisers and instructors in Civilian Conservation Corps Camps. U. S. Dept. Interior, C.C.C. Vocational Ser. 7 (U. S. Dept. Interior, Washington, D. C.), 94 pp., 1935.

This one of a series of outlines of instruction for C.C.C. camps is devoted to Conservation of natural resources. Another, No. 8, has the subject, Forestry. Chapters of No. 7 of interest in the present connection are on The Value of Wildlife, Agencies which Aid in the Conservation of Wildlife, The Organized Movement for Wildlife Conservation, and much of a section entitled Conservation of Natural Resources. Pertinent literature is listed.

Conservation: Needs of antelope

Gabrielson, Ira N. The antelope situation, American Game (Investment Bldg., Washington, D. C., 25 cents a copy), 24(4), July-August 1935, pp. 54, 59, 2 figs.

Antelope have increased in recent years and several good-sized herds exist. Refuge facilities are described and the need stressed for an unfailing year round food supply for the animals.

Conservation: Regulated take; reservations

Dymond, J. R. Problems in the conservation of game and fur-bearing mammals, Proc. Fifth Pacific Science Congress, Canada, 1933 (Univ. of Toronto Press), 5, 1934, pp. 4077-4078.

The necessity of preserving suitable conditions for the various species, and of regulating take so as to maintain optimum populations. Regulation should be based on adequate knowledge of life histories and fluctuations in numbers. The zone system of trapping (assignment of rights on a certain area to a single trapper) has worked well in British Columbia. Need of making nature reserves; if not done "there are many natural phenomena which we may never discover, much less understand".

Cycles: Disease as a factor

Green, Robert G. The periodic disappearance of game birds, Minn. Conservationist (State Office Bldg., St. Paul, Minn., 15 cents a copy), 29, Oct. 1935, pp. 2-3, 19, 4 photos.

"The ebb and flow of annual populations is a natural process now being referred to as a cycle." Discussion of the animals exhibiting cyclic phenomena in Minnesota. "The most logical explanation of the periodic die-off of resident animals is the development of epidemic disease." Notes on the diseases; ulcerative enteritis "incriminated as a major factor" in grouse destruction. Good management as an aid in recovery.

Cycles: Forecasting

Elton, Charles. Fluctuations in wild animal populations, Quart. Journ. Forestry (48 Dover St., London, W. 1, England, 2 shillings, 6 pence a copy) 29(3), July 1935, pp. 194-198.

A popular account of "cycles" in wild animal populations in relation to man. "It is already possible to forecast vole damage in Scotland, fox production and lynx production in Canada."

Disease: Aspergillosis in propagated wild turkey chicks

Durant, A. J. and C. M. Tucker. Aspergillosis of wild turkeys reared in captivity, Journ. Amer. Veterinary Medical Assoc. (221 N. La Salle St., Chicago, Ill., 40 cents a copy), N. S. 39(6), June 1935, pp. 781-784, 3 figs.

Of 785 poults on a Missouri State Game Preserve, fewer than 200 survived infection by Aspergillosus fumigatus from a commercial feed. The feed contained cod-liver oil and fish meal and was a good medium for development of the mold. "The report suggests the importance of using freshly prepared feeds, especially during the highly susceptible period of growth."

Disease: Botulism

Kalmbach, E. R. Will botulism become a world-wide hazard to wildfowl?, Journ. Amer. Veterinary Medical Assoc. (221 N. La Salle St., Chicago, Ill., 40 cents a copy), N. S. 40(2), Aug. 1935, pp. 183-187, 2 figs.

Review of occurrence of botulism in North and South America and especially in Australia. There the causative organism seems to be a different strain of Clostridium from that identified with the disease in America. Bibliography of 6 titles.

Disease: Parasites

Cameron, T. W. M. Parasites carried by wild animals of importance to man and domestic animals, Twenty-eighth Convention Internat. Assoc. Game, Fish, and Conserv. Comrs., 1934 (578 Madison Ave., New York, N. Y.), 1935, pp. 79-83.

General account of the principal parasites of wild animals, their interchange with domestic stock, and their importance to man.

Disease: Tularemia

Gerstell, Richard. Concerning tularemia, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 6(10), Jan. 1936, p. 6.

General account, animals affected, symptoms in humans, prevalence in Pennsylvania. Of 44 human cases on record in the State, 19 were contracted from handling of rabbits shot in the wild and 23 from dead rabbits shipped into Pennsylvania from western States for market purposes. The article argues for low infection rate of native rabbits, yet Pennsylvania has imported and released thousands of western rabbits, which if infected at a higher rate must have increased prevalence of tularemia in the State.

Ecology: Bird census method

Breckenridge, W. J. A bird census method, Wilson Bul. (Morningside College, Sioux City, Iowa, 60 cents a copy), 47(3), Sept. 1935, pp. 195-197, 1 graph.

By enumerating those encountered on compass lines about 150 feet apart and followed at right angles on alternate traverses. Adapted to learning total population and its disbribution over the census area.

Ecology: Clean-up work

Brandenburg, Araminta A. and Louis W. Campbell. The effect of certain relief projects on bird life, Wilson Bul. (Morningside College, Sioux City, Iowa, 60 cents a copy), 47(3), Sept. 1935, pp. 240-241, 1 table.

Clean-up work by the C.W.A., etc., reduced the number of birds' nests in Swan Creek Valley, Toledo, Ohio, by 87 percent in three years.

Ecology: Food shortage

Gerstell, Richard. Pennsylvania deer. Are they becoming gradually smaller?, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 6(7), Oct. 1935, pp. 10-11, 18-19, 6 photos.

Deer in certain areas apparently decreasing in average weight in a period of fifteen years. I breeding and unbalanced sex ratio rejected, scarcity of food in the affected regions, favored, as an explanation. Cut-over lands coming up to miscellaneous brush once provided ample food which later sapling growth decreased. Protective measures caused an increase of deer at the same time that the food supply was decreasing.

Ecology: Overgrazing

Barker, Elliott. Overgrazing, Twenty-eighth Convention Internat. Assoc. Game, Fish, and Conserv. Commrs., 1934 (578 Madison Ave., New York, N. Y.), 1935, pp. 28-30.

Description of the situation and recommendations. "The very great majority of all our grazing areas, including the National Forests, have at some time undergone a period of excessive use by livestock, resulting in serious damage and reduced carrying capacity. Subsequent examinations and inspections often result in erroneously attributing the damage to game animals, which in reality were not responsible for the original damage at all."

Ecology: Overpopulation

Anon. Deer - New Zealand's Enemy No. 1, Forest and Bird (Forest and Bird Protection Soc., P. O. Box 631, Wellington, N. Z. No price quoted), 37, August 1935, pp. 3-5, 4 photos.

Deer devour undergrowth thus preventing regeneration, and spoil the forest floor thus bring on erosion. "A great campaign to save the vitally necessary forests is far more important to the Dominion than anything else that is visible in the Government's programme."

Ecology: Overpopulation

East, Ben. Starvation stalks Isle Royale moose, American Forests (1713 K St., N. W., Washington, D. C., 35 cents a copy), 41(8), Aug. 1935, pp. 370-372, 399, 3 photos.

Account of trapping and transfer of live moose to the Michigan mainland. Losses through starvation were about one-third in each of the winters 1933-1934 and 1934-1935. Results of overbrowsing described and illustrated. Further trapping and shooting suggested as means of keeping the herd within bounds.

Ecology: Saltwater tolerance of wigeongrass

Bourn, W. S. Sea-water tolerance of Ruppia maritima, Contr. Boyce Thompson Inst. (Boyce-Thompson Institute for Plant Research Inc., Yonkers, N. Y.), 7(3), 1935, pp. 249-255, 1 graph.

In greenhouse cultures plants thrived in concentrations of sea water of from 0 to 80 percent normal ocean strength and remained healthy for three months in those up to 150 percent. "These results led to the conclusion that Ruppia maritima L. might be used advantageously in most coastal waters to replace Zostera marina L., which in recent years has almost completely disappeared from the Atlantic Coast." This conclusion must be viewed in the light of other limiting factors besides salinity of which wave action may be important in delimiting the ranges of these two plants.

Economics: Value of Canadian fur-bearers

Anderson, R. M. The distribution, abundance, and economic importance of the game and fur-bearing mammals of western North America, Proc. Fifth Pacific Science Congress, Canada, 1933 (Univ. of Toronto Press), 5, 1934, pp. 4055-4075, 17 figs. (range maps), 2 tables.

Brief accounts of the principal species; the Canadian take of furs for 1930-31; the annual value of raw fur production from 1920 to 1931 (10 to 18 million dollars yearly); present state of protection. "In some areas the natives would not be able to live unaided if the game were gone. A few dollars counted in the statistics may not mean much to persons 'outside' the

fur country, but the small sum may mean the ammunition supply for an Indian family which has no income except from hunting and trapping, or the small amount of flour and tea needed to keep the family from starvation. A small catch of weasels, mink, skunks, and muskrats by a poor settler on marginal lands may form an important element of the family budget during a bad year for crops, prices, or labour, and provide the small amount of cash to purchase needed staple supplies that cannot be raised on the land."

Food Habits: Coyote

Murie, Olaus J. Food habits of the coyote in Jackson Hole, Wyo., U. S. Dept. Agr. Circ. 362 (Supt. of Documents, Washington, D. C., 5 cents a copy), 24 pp., 2 tables, Oct. 1935.

Report on analyses of 64 stomach contents and 714 samples of feces collected over a four year period. One tabulation shows identifications, frequency of occurrence, and percentage of occurrences of food items, field mice and pocket gophers ranking well above any others. Another table classifies the food items into groups according to whether their destruction was beneficial, neutral, or harmful from the standpoint of man. "70.29 percent may be credited to the animal as indicating economically beneficial feeding habits; 18.22 percent may be classed as neutral, and only 11.49 percent may be charged against the coyote. x x x The balance is overwhelmingly in favor of the coyote in this locality."

Food Habits: Hawks in Connecticut

Anon. Connecticut Hawks - what they look like in the air, National Assoc. Audubon Societies (1775 Broadway, New York, N. Y.). Poster, printed information on back. 1935.

Reproduction of 15 of Peterson's flight silhouettes from the May hawk book and on the reverse a tabulation showing the proportions of 8 species in the hawk population of Connecticut, and graphically illustrating their food.

Food Habits: Hawks in Minnesota

Breckenridge, W. J. A new deal for Minnesota's hawks, Minn. Conservationist (Dept. of Conservation, State Office Bldg., St. Paul, Minn., 15 cents a copy), 30, Nov. 1935, pp. 8-9, 12, 15, 5 figs., 1 table.

An original contribution to knowledge of the economic relations of Minnesota hawks based on approximately 275 stomach analyses. Of the 7 common species, only the sharp-shinned and Cooper's hawks are judged more detrimental than beneficial.

Food Habits: Hawks in Pennsylvania

Luttringer, Leo A., Jr. Hawks - What they eat, Nature Magazine (1214 - 16th St., N. W., Washington, D. C., 35 cents a copy), 26(3), Sept. 1935, pp. 173-175, 177, 3 photos.

Essentially a summary of the stomach contents of 1101 Pennsylvania hawks of 11 species. A remarkably large number (438) of goshawks reported upon. Nearly half of the total number of stomachs of all species collected were empty or unfit for stomach analysis. This article with the addition of a tabulation of results presented in Warren's "Birds of Pennsylvania" was reprinted in rearranged form and unpaged (4-page folder) by the National Association of Audubon Societies (1775 Broadway, New York, N. Y.).

Food Habits: Owls in Minnesota

Breckenridge, W. J. Science judges the owl, Minn. Conservationist (Conservation Commission, St. Paul, Minn., 15 cents a copy), 31, Dec. 1935, pp. 5-6, 16, 4 photos.

General sketch of 10 species occurring in Minnesota with report on 98 stomach analyses. Only the great horned owl is considered an economic liability. The snowy and screech owls are perhaps neutral and the others more beneficial than injurious.

Food Habits: Methods of presenting data

Mohr, Carl O. Value of prey-individual analysis of stomach contents of predatory mammals, Journ. Mamm. (W. H. Burt, Museum of Zoology, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 16(4), Nov. 1935, pp. 323-324.

Contention that the numerical system of dealing with stomach contents of predatory mammals is superior to the volumetric. This debate has been carried on for an indefinite period. A combination method seems not only desirable but also necessary as certain classes of food are not countable.

Food Habits: Winter food of deer in Massachusetts

Hosley, N. W. and R. K. Ziebarth. Some winter relations of the white-tailed deer to the forests in north central Massachusetts, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 16(4), Oct. 1935, pp. 535-553, 5 tables.

This report is based chiefly on studies carried on in the town of Petersham, Mass., which included both field observations and stomach analyses. Account of results is preceded by description of the region, its winter weather, and vegetation. Cover types are discussed and the occurrence in them indicated of the 11 most important species of deer food. These are apple, dwarf raspberry ground hemlock, wintergreen, red maple, black cherry, hemlock, hazelnut, staghorn sumac, red oak, and pasture juniper. Field observations on deer feeding

are tabulated, and red maple is indicated as the most important browse species. A table is given of food items found in 24 stomachs of which apple (fruit) is greatly predominant (61%). Bedding preferences and habitat changes are discussed and suggestions made as to forestry practice that may improve deer range. Bibliography of 12 titles.

Life Histories: California quail

Sumner, E. Lowell, Jr. A life history study of the California quail, with recommendations for its conservation and management, Part I, California Fish and Game (Fish and Game Commission, 450 McAllister St., San Francisco, Calif., 25 cents a copy), 21(3), July 1935, pp. 167-256, 15 figs., 12 tables.

A study independent of the Sporting Arms and Ammunition Manufacturers group but inspired by and modeled after them. Cooperative between the Division of Fish and Game and the University of California. The first or life history installment treats food habits and requirements, water requirements, and general ecological requirements. Green food was found quite important and legumes the most utilized family of plants. Tables itemize the foods according to months for 102 adult and 14 young quail. Numerous matters associated with food and feeding are discussed. The need for water controversy is disposed of by the finding that although the quail can live, and produce and rear young when water is only indirectly available, in the arid country typically inhabited by the species, such availability is governed by the distribution of surface water supplies, near which, and only there, do the birds nest in a state of nature. Good interspersion of cover and food and some available form of water are basic ecological requirements.

The effects of human activities upon quail seem mostly inimical. Life-history studies are reported on under the headings of calls, social organization, covey formation and range, courtship, care of young, growth and behavior of young, general behavior of adults, mortality, population studies, weight changes and plumages. The contents of Part I are summarized, pp. 251-256. Part II, in press, will be abstracted later.

Life Histories: Hawks

May, John B. The hawks of North America, National Assoc. Audubon Soc. (1775 Broadway, New York, N. Y., $1.25 a copy), 140 pp., 36 col. pls., 4 wash pls., 23 tables, 33 maps.

A thoroughly and beautifully illustrated and concise but comprehensive account of the hawks of America north of Mexico, with special attention to their economic value. Numerous small maps illustrate the ranges and tabulations summarize the results of examinations of stomachs and crops published by various authorities. An appendix summarizes State laws relative to hawks. There is an 8-page bibliography but no index.

Life Histories: Hungarian partridge

Leopold, Aldo. Review of Zur Biologie des Rebhuhns by Dr. W. Nolte, Wilson Bul. (Morningside College, Sioux City, Iowa, 60 cents a copy), 47(4), Dec. 1935, pp. 300-303.

The findings of the original, a compilation of hunters' reports and weather data, are succinctly given in 36 numbered paragraphs. The worst predators were cats and dogs, all native forms being relatively harmless. "The welfare of the partridge is directly proportional to sunshine, warmth, and dew, and inversely porportional to rainfall."

Life Histories: Porcupine

Taylor, Walter P. Ecology and life history of the porcupine (Erethizon epixanthum) as related to the forests of Arizona and the southwestern United States, Univ. Ariz. Bul. (University of Arizona, Tucson, Ariz.), 6(5), July 1935, 177 pp., 9 pls., 18 figs., tables.

Studies of the author dating back to 1924, work of other Biological Survey men, and supplementary information from the literature competently compiled. Distribution and physical traits of the porcupine, food habits especially in relation to trees, breeding habits, enemies, parasites, and wanderings are treated. Suggestions are given on capturing and handling the animals, on caring for them in captivity, and on methods of control. There is a full bibliography but no index. Clearing away of forest growth, and overgrazing, diminishing the food supply of the porcupine have been important factors in bringing about destructive feeding by the animal. The suggestion is made that sound management in many cases may obviate the necessity for destroying injurious animals. "The need for porcupine control operations may perhaps fairly be regarded as a kind of measure of man's inefficiency in dealing with nature." Under existing conditions, however, damage is serious. "There is little difficulty in maintaining a forest if one has virgin timber to start with; but in heavily cutover tracts one can scarcely be sure of getting anything."

Life Histories: Sex ratio in ducks

Furniss, O. C. The sex ratio in ducks, Wilson Bul. (Morningside College, Sioux City, Iowa, 60 cents a copy), 47(4), Dec. 1935, pp. 277-278, 1 table.

Observations on the breeding grounds in Saskatchewan on 14 species; range of proportions of the sexes in these species, male:female, 1:1 to 3.4:1; average 1.6:1.

Management: Beaver in relation to trout

Salyer, J. C., II. A program of beaver management. Recommended for the maintenance of both beaver and trout in Michigan, American Game (Investment Bldg., Washington, D. C., 25 cents a copy), I, 24(3), May-June 1935, pp. 39, 47-48, 4 photos; II, 24(4), July-August, 1935, pp. 55, 62-64, 6 photos.

Part I contains suggestions for control by trapping, and Part II, control by blowing out dams, frequency of beavers to be tolerated, and general suggestions. The suggestions are for comparatively flat country where beaver ponds collect silt, and not for mountainous areas. Destruction of dams there is wholly without justification and is not for the welfare of trout.

Management: Bobwhite

Stoddard, Herbert L. Cooperative Quail Study Association Fourth Ann. Rep. (Thomasville, Ga.), 20 pp., Sept. 1935.

Matters of general interest include sections on controlled burning, on experiments with cover and food plants, on volunteering of plants valuable on game range, on fire ant and disease studies, and on experiments with "red" quail.

Management: Cover plants

Anon. Woody plants of Iowa recommended for game cover, Iowa State Planning Board (Des Moines), 18 pp., 1 table, 4 figs., 1935. Mimeographed.

Cover types and plants valuable in providing each; table showing hardiness, soil requirements, and methods of planting 20 groups of cover plants, and text giving descriptive notes and suggestions on propagation and transplanting.

Management: Demonstration projects

Gordon, Seth. Quail demonstrations become lighthouses of knowledge on wildlife restoration, Twenty-eighth Convention Internat. Assoc. Commrs., 1934 (578 Madison Ave., New York, N. Y.), 1935, pp. 38-44.

The value of research in game management but particularly of application of the results. Principally an account of cooperative quail management demonstrations instituted by the American Game Association, the Biological Survey, and various individuals and organizations in Oklahoma, Arkansas, Tennessee, South Carolina, North Carolina, and Indiana. Noteworthy plans or results are noted for four of the projects. Similar information is given for Iowa State demonstrations.

Management: Farmer-sportsman relationships

English, P. F. Northwest Kent game management area, American Wildlife (formerly American Game, Investment Bldg., Washington, D. C., 25 cents a copy), 24(5), Sept.-Oct. 1935, pp. 71, 79-80, 4 photos.

Account of a year's operation of a sportsman-farmer-department game management plan in Kent County, Mich. Notes on organization, policy, steps taken to improve conditions as planting feed patches and food-producing shrubs. Recommendation as to wild plants to be spared on farms.

Management: Furbearers

Hamilton, W. J., Jr. The fur-bearers of New York in their relation to agriculture, Cornell University (Ithaca, N . Y.), Ext. Bul. 319, 25 pp., 9 figs., 4 tables, March 1935 (rec'd Sept. 26).

Value of furs in the nation and in New York State; "the bulk of trapped fur-bearers are taken by the farmer or by one of his family"; general account of the food habits of skunk and weasel; use of fur-bearers for food; need for greater protection of the animals; suggestions on trapping, and on care of pelts.

Management: Herd reduction

Childs, F. W. Management of the Yellowstone elk, American Wildlife (formerly American Game, Investment Bldg., Washington, D. C., 25 cents a copy), 24(5), Sept.-Oct. 1935, pp. 69, 77-78, 2 photos.

Description of methods by which a predetermined reduction of some 3000 head was accomplished.

Management: In German forests

Shepard, Ward. Notes on German game management, chiefly in Bavaria and Baden, Senate Document, 73rd Congress, 2nd Session (Senate Special Committee on Conservation of Wild Life Resources, Washington, D. C.), 16 pp., tables, 1935.

This report containing information very desirable for American wildlife managers and foresters treats game management in the State Forests, including protection, care, and feeding of game, density of stocking, policy relating to predatory animals, game statistics, game revenue, training of personnel, and game research. "Conclusions" call attention to phases of German game management from which lessons may be drawn for American application.

Significant sentences: "it is a principle of the Bavarian Forest Service that game production must be as great as the supply of game feed and the prevention of undue injury to forests and farms will permit." "Game

management in all its phases (from feeding to killing) is undertaken directly by the forest service." "The fundamental fact of game management in German State Forests is simple, direct, absolute quantitative and qualitative regulation of kill." "There is now a strong reaction against the pure spruce forest in favor of mixed growth x x x strongly influenced by the difficulty of feeding an abundant supply of game where there is little natural browse or grass." "The general principle followed in German game management is to hold the predatory animals in reasonable check and to afford the game animals special protection against them." "Predatory animals are shot or taken in traps. The use of poison is, as a rule, not resorted to, and is regarded as unethical." "Of the total forest receipts, the income from game is forty-four hundredths of 1 percent, a fact that strikingly demonstrates the relatively unimportant economic value of game as compared with its scientific and recreational value."

Management: In National Parks

Borell, A. E. Preservation of wildlife in National Parks of Southwest is big problem, New Mexico (808 W. Gold Ave., Albuquerque, N. M., 15 cents a copy), 13(11), Nov. 1935, pp. 30, 31.

"Predators, rodents, reptiles, and amphibians have just as much right to Park Service attention as does big game." "The biologist realizes that artificial feeding fosters weak and sick animals, reduces stamina and wariness, interferes with natural migration, attracts predators, and that concentration of animals facilitates the spread of disease." The Southwest badly overgrazed but on a certain National Monument with grazing eliminated there "is a fine stand of mesquite and creosote bush, and dense undergrowth is waist high. Here we find numerous Gambel quail, cottontails, many other rodents and hundreds of birds; a decided contrast to the surrounding area". Notes on treatment of springs.

Management: In National Parks

Wright, George M. Big game of our National Parks, Scientific Monthly (Lancaster, Pa., 50 cents a copy), 41(2), Aug. 1935, pp. 141-147, 6 photos.

General account with the following management items: Hemorrhagic septicemia in Yellowstone bisons was controlled by inoculating the entire herd with an especially prepared vaccine; a thousand feral burros eliminated from Grand Canyon to improve conditions for bighorn sheep. Remark on feeding Yellowstone elk, "elk, like human beings, are not improved by being pauperized".

Management: New England forest wildlife

Hosley, N. W., et al. The essentials of a management plan for forest wildlife in New England, Journ. Forestry (839 Seventeenth St., N. W., Washington, D. C., 65 cents a copy), 33(12), Dec. 1935, pp. 985-989.

Report of Subcommittee on fish and game management, New England Section, Society of American Foresters. For the area to be managed, a description, history, and type map are needed; the probable carrying capacity, present stock, and limiting factors should be learned; and plans made for improvement with respect to food, cover, and other wildlife essentials. Bibliography of 6 titles.

Management: Planting to feed wildlife

Westveld, R. H. and J. L. Van Camp. Forest planting on Michigan farms, Mich. State College (East Lansing, Mich.) Extension Bul. 147, 44 pp., 13 figs., 3 tables, October 1935.

The value of vegetation to wildlife is given considerable prominence. A list of trees for forest planting specifies use as food and cover for birds and deer and indicates utilization by a few other forms of wildlife. In a tabulation of shrubs and vines, utilization by game birds and by the cottontail rabbit is shown.

Management: Ruffed grouse

Fromack, Harriet. Ruffed grouse research, The Du Pont Magazine (E. I. Du Pont de Nemours & Co. Inc., Wilmington, Del.), 29(11), Nov. 1935, pp. 10-11, 23, 4 photos.

This article is welcome for news of the Minnesota Ruffed grouse investigation which has been rather hard to get. Notes are given on annual counts of birds on the Cloquet area which revealed cyclic fluctuation. Normal carrying capacity is one grouse to four acres and the cruising radius of an individual bird is about a half mile. Methods of marking the birds for recognition in the field are described. Chipmunks remove eggs from nests but do not eat them. The article is marred by propaganda to the effect that "Prohibiting shooting will not solve the problem" of ruffed grouse maintenance. While shooting may be tolerated during the higher stages of ruffed grouse numbers, it might prove excessively destructive during the lows. If shooting be regarded as an implement for smoothing the curve of fluctuations, it can be so used only during the highs. During the lows, it could only make them lower and is something that should be controlled or even prohibited during that phase of the cycle.

Management: Waterfowl

Pirnie, Miles D. Michigan waterfowl management (Mich. Dept. Conservation, Lansing), 328 pp., frontis. + 212 figs. (photos), 14 tables, 2 maps, 1935.

This is the first American work comprehensively devoted to waterfowl management. Accounts are given descriptive of birds of this group occurring in Michigan and their habits, with special attention to nests, eggs, and downy

young, and to migration and dispersal. Chapters are devoted to The Status of Waterfowl, Natural Enemies (including diseases), Waterfowl Hunting, The Management Idea, Laws and Regulations, Refuges and Sanctuaries, The Duck Food Problem, Planting Programs, Propagation and Restocking, Predator Control, and Restoration. Keys to fifty common aquatic plants of Michigan and a tabulation of the contents of several score crops and gizzards form an appendix. Something over six pages are devoted to a bibliography and there is a good index.

"The aims of waterfowl management in Michigan may be summed up as follows:

1. To inventory Michigan waterfowl, both nesting and migrant.

2. To evaluate the destructiveness of the gun, predators, diseases, and all other known destroyers of waterfowl in Michigan.

3. To develop a plan for waterfowl protection, increase, and more wide-spread use and appreciation.

4. To improve conditions for waterfowl, especially in connection with such other projects as water storage and fish and fur production.

5. To consider Michigan waterfowl questions and programs as a part of and not apart from the national waterfowl situation."

The method of treatment of the subject matter of the book is realistic and reasonable. The discussions of ecological conditions in relation to aquatic plants, and of the subject of predation, are especially good.

Characteristic conclusions: "Opinions are easier to get than are the essential facts as to waterfowl conditions" (p. 62). "It is very likely that the adverse effect of drought on waterfowl as a whole has been a bit exaggerated" (p. 65). "Circumstantial evidence tends to exaggerate the numbers of waterfowl of all ages that are killed by predatory birds and mammals" (p. 68). "Evidently seasons longer than five or six weeks will result in too great a kill of most kinds of ducks under present conditions of waterfowl concentrations and under existing hunting methods" (p. 114). "If waterfowl are steadily decreasing, past protection must have failed of its purpose" (p. 120). "Duck foods are neither as scarce nor as limited in distribution as is frequently claimed" (p. 185). "The best carp producing areas of Michigan x x x continue to be important feeding grounds for waterfowl" (p. 195). "The value of wide-spread predator control in Michigan has not been demonstrated" (p. 261). "No matter how successful or extensive future restoration programs may be, we cannot afford to neglect improved protection programs" (p. 289).

Management: Winter food supply

Dalke, Paul D. Shrubs for game and other birds, American Wildlife (formerly American Game, Investment Bldg., Washington, D. C., 25 cents a copy), 24(5), Sept.-Oct. 1935, p. 70, 1 table. Also published as Game Management Circ. 1, Conn. State Board of Fisheries and Game, Hartford.

Discusses methods of propagating and gives a table containing scientific and vernacular names, and season of fruiting of 28 species of especial value as winter food in Connecticut.

Predators: On quail eggs

Lehmann, Valgene. The relation of predators to quail increase, Twenty-eighth Convention Internat. Assoc. Game, Fish, and Conserv. Commrs., 1934 (578 Madison Ave., New York, N. Y.), 1935, pp. 36-38, 5 tables.

The season when eggs are in the nest the weakest point in life history of the bobwhite. One hundred "dummy" nests containing actual quail eggs were set up in four localities of which 97 were destroyed by various predators, the leading ones of which were hog, 19 percent; armadillo, 18; fox, 13; and skunk, 13. The armadillo is a highly insectivorous animal and the finding of quail nests is "purely accidental". The animal being common, however, the "accidents" are frequent. "Not a single young quail was hatched in the areas where we conducted our study prior to our departure on July 1." Lehmann's observations and experiments seem to "prove too much" as he says the observational tracts "were selected because both quail and predators were present in goodly numbers".

Predators: Relative to wildlife populations

Dymond, J. R. What of the predator?, Proc. Fifth Pacific Science Congress, Canada, 1933 (Univ. of Toronto Press), 5, 1934, pp. 4079-4080.

Speculation as to relation of predators to cyclic phenomena. In the absence of predators, populations increase and may suffer from food shortage or disease. "It is impossible to eliminate the predator without ultimate injury to the health, vigour, and other desirable qualities" of species.

Predators: Vermin campaign in West Virginia

Reese, Albert M. The destruction of "vermin", Science (Lancaster, Pa., 15 cents a copy), 82(2138), Dec. 20, 1935, pp. 593-594, 1 table.

Presents a tabulation of 191,511 animals killed as "vermin" in 26 counties of West Virginia in a year. Among them are 79,481 snakes, 13,497 water dogs, 15,370 turtles, 4,417 terrapins, 18,089 chipmunks, showing indiscriminacy of the campaign.

Propagation: Artificial incubation and brooding

Weisner, E. S. Artificial incubation and brooding of game birds, Mich. Agr. Exp. Sta. Quarterly Bul. (East Lansing, Mich.), 17(3), Feb. 1935, pp. 113-116, 1 table. Also issued as a separate, pp. 1-4, 1 table.

Account of adoption of these methods, equipment, and results for 7 species of game birds.

Propagation: Bobwhite

Barron, Frank, Jr. Pen-raising the bobwhite, Modern Game Breeding (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 5(12), Dec. 1935, pp. 4-5, 1 photo.

A stock account of methods used on a West Vriginia game farm; nothing novel.

Propagation: Brooder house

Le Compte, E. Lee. Bob-white - our most aristocratic game bird, Twenty-eighth Convention Internat. Assoc. Game, Fish, and Conserv. Commrs., 1934 (578 Madison Ave., New York, N. Y.), 1935, pp. 32-36.

Mainly an account of a large brooder house intended to make possible production of bobwhites throughout the year.

Propagation: Cock quail as brooders

Klose, William F. What! No brooder?, Modern Game Breeding (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa.), 5(11), Nov. 1935, pp. 4-5.

Experience with the use of surplus cocks in brooding and rearing California Valley quail. Economical, increases the percentage of successfully reared birds, eliminates risk of infection by poultry diseases. Description of equipment and methods.

Propagation: Ducks, semi-artificial

Lincoln, Frederick C. Raise ducks!, Field and Stream (578 Madison Ave., New York, N. Y., 25 cents a copy), 40(6), Oct. 1935, pp. 34-35, 63-65, 2 photos.

Sparse returns from banded mallards released from game farms indicate the birds scarcely become incorporated with the wild waterfowl population. One and one-half percent return contrasted with a normal expectancy of from 20 to 25 percent. Comment on the Flanders duck, a hybrid mallard x black which seems to do better. Description of nesting shelters.

Propagation: Feed formulas

Smith, E. C. Fall and winter pheasant feed, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 6(7), Oct. 1935, p. 6.

Two formulas for fall and winter, and for the breeding period, respectively, composed of different proportions of cracked corn, wheat, buckwheat, kaffir corn, and sunflower seed.

Restocking: Trapping and shipping mountain sheep

Hume, B. B. Mountain sheep round-up, Outdoor Life (353 Fourth Ave., New York, N. Y., 15 cents a copy), 76(4), October 1935, pp. 20-21, and 51 5 photos.

Description and photographs of trap and account of capture and transportation of 20 specimens (Wyoming).

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

Additional numbers of interest to wildlife managers are listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-19. Plants valuable for wildlife utilization and for erosion control, by W. L. McAtee, October 1935, 11 pp.

Lists genera of plants valuable to wildlife as cover, browse, herbage and as mast, fruit, and seed producers. Catalogs plants of these categories that have been recommended for use in erosion control.

BS-26. Directions for poisoning piron jays, 2 pp., November 1935.

BS-27. A cage trap useful in the control of white-necked ravens, by S. E. Aldous, January 1936, 4 pp., 1 fig.

Notes on range, characters, and economic relations of the raven, with plans, specifications and instructions for building and operating the trap.

SPECIAL ARTICLE

The Biological Survey in relation to game management*

Accepting Leopold's definition that "Game Management is the art of making land produce sustained annual crops of wild game for recreational use", it seems probable that participation in game management by the Biological Survey will be only limited and qualified. The principle has already been established that on National Forests the function of the Survey is research and planning. The Forest Service will conduct the actual operations, which, according to definition, constitute game management. Since lands controlled by the Biological Survey itself are so largely inviolate sanctuaries, game management upon them will be of a qualified type in that there will be no harvesting of annual crops for recreational use unless overflow is so considered.

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* Prepared in December 1934 only to which date the figures cited are valid. In 1935 field inspections were carried on as before and the cooperative work referred to in the next succeeding article was organized.

It can be said without reserve, however, that game management is the application, with respect to the species concerned, of knowledge about wildlife, its environment, and the improvement thereof, the gathering and dissemination of which have long been major activities of the Biological Survey. Among studies of the Bureau, results of which are ready for immediate use, are investigations of the classification, distribution, and migrations of animals, of their ecological inter-relations, disease, and of methods of reducing the numbers of certain species locally objectionable. From the beginning emphasis was placed on food habit studies, and with reference to this line of work, Stoddard in the Third Annual Report of the Cooperative Quail Study Association (November 1934) says "This Division is of vital importance to sportsmen and wild life lovers of the entire country," (p. 3). Leopold in a letter of December 3, 1934 writes "none of the work with which I am connected would have been possible without the cooperation of the Survey in stomach analyses and banding."

Stoddard is our foremost working game manager and Leopold our leading exponent of its philosophy. By their complimentary references, they mean that the general knowledge developed by the Biological Survey is of fundamental value to game managers, and that the assistance of the Bureau in identifying food plants, seeds, and other material, and of making analyses of the stomach contents of game species, their competitors, and predators, is of the greatest practical assistance in connection with game management problems.

Because some do not know the fact, and others may have forgotten, it may well be recalled that Stoddard learned game management as an employe of the Biological Survey. He knew nothing of it when he came to us but was selected for his good biological background, his personality, and his demonstrated liking for arduous field work. He was an employe exclusively of the Biological Survey from January 1924 to September 1930, during which period the Cooperative Quail Investigation and the reports upon it were carried to completion and the Biological Survey's cooperation with Research Fellows of the Sporting Arms and Ammunition Manufacturers' Institute was practically completed. These Research Fellows, namely, Yeatter, Errington, King, and Gorsuch, constitute what may well be called the Nation's first graduating class of game managers and their accomplishments were certainly greatly facilitated by Biological Survey assistance.

In subsequent years, Stoddard has worked intermittently for the Bureau on game management projects outside of the area of the Cooperative Quail Investigation - experience which cannot have failed materially to broaden his knowledge.

The final report of the Cooperative Quail Investigation, a 600-page book on "The Bobwhite Quail, Its Habits, Preservation, and Increase", published in 1931, is one of the two most outstanding publications in the game management field, the other being Leopold's textbook. The quail book is distinctly a Biological Survey and a Department of Agriculture product. The work was done and the book written by Survey men under Bureau appointment and supervision and was collaborated in by representatives of other Bureaus, especially by

those of the Zoological Division of the Bureau of Animal Industry. The Misses Cram, Jones, and Allen of that Division did both field and laboratory work and furnished an excellent chapter on Internal Parasites and Parasitic Diseases, and Chas. O. Handley, an employe of the Biological Survey even prior to Stoddard's appointment, participated in most of the investigation and is joint author of chapters on Food and Feeding Habits and on Quail Preserve Development and Management. Clarence Cottam organized the former chapter including in it the results of considerable laboratory work by himself and by F. M. Uhler. E. R. Kalmbach made field studies for, and prepared, the colored illustrations adorning the work. W. L. McAtee edited and re-edited every paragraph of the book more than once as did also the Bureau Editor, W. H. Cheesman. Although the Quail Book was published by an outside concern, we must not forget, nor allow others to forget, that it is just as much a Biological Survey production as if it had appeared in some official series. The work is recognized as laying the foundation of practical upland game bird management in this country.

Leopold says that "the technique of altering range for greater productivity x x x is the principal subject" (p. viii) of his textbook, and this subject which he evidently considers the core of game management is one with which, aside from the Quail Investigation, the Biological Survey has worked for many years. W. L. McAtee began the inspection of wild fowl habitats and the making of recommendations for their improvement in 1908, and subsequently he and other members of the Bureau have made hundreds of similar inspections and reports. Study and recommendations relative to upland areas began some years later and have continued to the present time, Stoddard being specially engaged for numbers of them.

To 1934, inclusive, publications of the Biological Survey devoted to environmental improvement number four in the waterfowl class and ten bearing on upland game management; two publications on winter feeding of game birds have been issued.

Publications on food habits giving the general background of knowledge so essential to the game manager have numbered two relative to waterfowl, dealing with all of the shoal water ducks except one (the shoveller), and six relating to upland game birds, including all but the band-tailed pigeon.

Regional reports on food resources for waterfowl have been published relating to the Bear River Marshes, the Sandhill Region of Nebraska, and the State of North Dakota, and manuscripts awaiting publication deal with Missouri, Minnesota, Wisconsin, and Montana.

The propagation of game birds, sometimes a necessity for providing seed stock, has been dealt with in three Farmers' Bulletins and five other publications.

Unofficial articles have kept pace in number with official documents and have treated almost all phases of game management. No fewer than ninety or about 22.5 percent of the publications cited in the bibliography of Leopold's "Game Management" are by Biological Survey employes. In April 1934, there were listed 46 official publications of the Bureau, 6 unpublished manuscripts, and 27 unofficial articles, dealing with wildlife management, that had been prepared

by members of the Division of Food Habits Research alone.

The Biological Survey has participated in every significant move that has been made looking to the establishment of game management in this country. This Bureau organized and carried to satisfactory completion the Cooperative Quail Investigation that was the inspiration of the whole series of subsequent investigations in various parts of the country, it actively cooperated in every one of the researches in game management sponsored by the Sporting Arms and Ammunition Manufacturers' Institute, it cooperated with the American Game Association in the organization and conduct of several Experimental Quail Management Projects, and it has cooperated in the Iowa Conservation Plan, and in projects inaugurated in Michigan by Professor Wight and in Wisconsin by Leopold. The Survey has made food analyses for the New England and the New York Ruffed Grouse Investigations, the Wisconsin Prairie Chicken Study and others on quail in New Mexico and California. It has lent its assistance in advice, field inspections, and recommendations in connection with Wildlife Management on the Soil Conservation Projects, has made special inspections and reports for the Tennessee Valley Authority, the Forest Service, and others. The Bureau has furnished material for, and read in manuscript or proof, practically all of the publications that have been issued by More Game Birds in America, although it must be said that not all of our suggestions have been accepted. Various members of the Biological Survey read part or all of the manuscript of Leopold's textbook on Game Management and he makes acknowledgment to seven of them.

To sum up: since the Biological Survey has had a part in practically all game management movements, however sponsored, its part probably has been greater than that of any other one organization. In other words, the Bureau has done its full share in the light of the emphasis that has been placed on game management in the period reported upon, and it is now continuing in the forefront of the movement by inauguration of cooperative research and demonstrational projects at several land grant colleges.

Game management involves size-up of the environment including its soil and water supply, its plants and animals, and their habits, tolerances, diseases, distribution, movements, and abundance; it requires maintenance of environmental conditions when they are favorable, and improvement when they are not, objectives involving planting, clearing, controlled burning, fertilization, cultivation, in fact almost the whole gamut of agricultural and silvicultural operations; it contemplates the measurement of game populations and their productivity, and regulation of the kill. There are no first steps that can be taken and forgotten; no, there must be continuous attention to all phases of the subject. To this point the specifications agree with Leopold's definition of game management as the "art of making land produce sustained annual crops of wild game for recreational use". The definition must be extended, however, if it is to cover the modern demand that these annual crops be marketed to provide revenue or even a profit.

The undertaking is vast, comprehensive, complex, and there seems to be no instance in which game management has been carried on with attention to all parts of the program outlined, nor of continued success as a self-supporting or profit-making endeavor. Locally it has been demonstrated that revenue can be derived from the disposal of hunting privileges, but it has not been shown either in this country or elsewhere that intensive game management can be carried on as a business undertaking, all costs figured in, and made to yield profits.

The foremost students and practitioners of game management admit that the whole subject is in an elementary stage, vastly in need of more data in almost every direction, and suffering greatly for lack of the guidance of technical studies and scientific experimentation.

In view of the state of the matter as here disclosed, and of limitations upon the functions of the Biological Survey, it seems that aside from the refuge program, and in part there, the Bureau can serve game management best as a research organization. It can aid now in preliminary surveys and recommendations, the quality of which will steadily improve with growth in pertinent knowledge and in the specific experience of those doing the work, and it can perform essential services in identifying a great variety of material and in making food analyses. It can continue the production of reference works, containing detailed information on animals, their diseases, foods, cover, and general ecology, and on the enumeration, study, and regulation of animal populations, that are vitally necessary to the game manager.

The Biological Survey, collectively, knows as much, or more, about game management than any other single group, but it also knows that the greatest need of the subject and one which it is eminently proper for a government Bureau to supply is for more and still more research, the results to be passed on to all concerned as rapidly as practicable. In relation to game management, research is the Bureau's proper field and it should be cultivated diligently.

To end with another quotation from Leopold, the State should be "the leader rather than the doer in game matters."

INAUGURATION OF COOPERATIVE WILDLIFE RESEARCH AND DEMONSTRATION PROJECTS

Cooperative agreements, each running for five years, have been entered into with a land grant college and the conservation commission in eight States, under which research and demonstration in wildlife management will be carried on. Each unit will undertake a major research problem, will assist in finding solutions to technical problems arising in wildlife administration, cooperate with management demonstration of locally important species, and carry on extension and educational work as may be feasible. The projects are being supported by contributions from the land grant college (a third), the State game department (a third), and the Biological Survey and the American Wildlife Institute (together a third).

The locations selected for inauguration of the work, the men assigned, and brief statements of their education and experience, are herewith recorded.

Alabama Polytechnic Institute, Auburn.

Harold S. Peters.

Ohio State University B.Sc., 1925; M.Sc., 1926; assistant in entomology 1925-1926; U.S. Bureau of Entomology and Plant Quarantine, corn borer research, 1924, 1925; assistant entomologist, 1928-1935; Virginia Truck Experiment Station, assistant entomologist, 1926-1928; George Washington University, instructor in entomology, 1933-1934; Biological Survey, associate biologist, 1935-

Member, American Association for the Advancement of Science, American Ornithologists' Union, American Association of Economic Entomologists, Entomological Society of Washington, Ohio Academy of Science, Sigma Xi.

Principal papers: Mallophaga of Ohio birds; Ectoparasites and bird-banding; External parasites collected from banded birds; A list of external parasites from birds of the eastern part of the United States.

Connecticut State College, Storrs.

Paul D. Dalke.

University of Michigan BSF, 1925; MSF, 1928; Ph.D, 1934; U.S. Forest Service, summer employment, 1922, 1925; technical foreman, 1933-1934; University of Michigan, junior instructor, 1928-1931; research fellow in wildlife management, 1931-1933; National Park Service, ranger naturalist, 1929; Connecticut Board of Fish and Game, director of game management, 1934-1935; Biological Survey, associate biologist, 1935-

Member, American Association for the Advancement of Science, American Society of Mammalogists, Society of American Foresters, American Wildlife Association, Sigma Xi, Phi Sigma.

Principal papers: Dropping analysis as an indication of pheasant food habits; Carrying capacity of pheasant range; Food habits of young pheasants; Food habits of adult pheasants; Economic status of the pheasant in Michigan.

Iowa State College, Ames.

Logan J. Bennett.

Central College BS, 1930; Iowa State College MS, 1932; wildlife research, 1931-1934; Iowa Fish and Game Department, game technician, 1934-1935; E.C.W. camp, game technician, 1935; Biological Survey, associate biologist, 1935-

Member, Gamma Sigma Delta, American Ornithologists' Union, Wilson Ornithological Club, Iowa Ornithologists' Union, Cooper Ornithological Club, Ecological Society of America.

Principal papers: Lost legions; Midwest duck breeding grounds; Iowa duck studies, all as joint author with Paul L. Errington; A comparison of two Iowa duck nesting seasons; The 1934 spring migration of shore birds through Clay and Palo Alto Counties, Iowa.

Maine: State University, Orono.

Clarence M. Aldous.

Utah Agricultural College BS, 1917; University of Minnesota MS, 1923; Extension Service, U. S. Department of Agriculture, county agent, rodent control, 1919-1921; Instructor High School, Idaho, biological science, 1924-1925; Utah 1925-1928; Coalville High School, vocational agriculture and biology, 1928-1929; Biological Survey, junior biologist, rodent control, 1929-1930; assistant biologist, research in forest wildlife, 1931-1935; associate biologist, 1935-

Member, American Society of Mammalogists, Wilson Ornithological Club, Society of American Foresters.

Principal papers: The possibilities of the Red Lake Wildlife Refuge; Are all hawks and owls detrimental?; Seasonal food habits of snowshoe hares; Breeding habits of snowshoe hares; Migrations and homing instincts of snowshoe hares.

Oregon State College, Corvallis.

Arthur S. Einarsen.

University of Washington BS, 1924; U.S. Bureau of Fisheries, field assistant, 1922, 1923; Washington State Department of Fisheries, in charge of biological work, 1923-1933; Washington State Game Department, assistant director and biologist, 1933-1934; Fisheries Association, Seattle, Wash., biologist, 1934; U.S. Forest Service, inspector detailed to the Biological Survey in connection with game management in National Forests, 1935; Biological Survey, deputy U.S. game management agent, 1934, 1935; associate biologist, 1935-

Member, Pacific Northwest Bird and Mammal Society, American Ornithologists' Union.

Principal papers: The black brant in Washington State; Economic factors in the saltwater rearing of salmon; Perpetuating herring by conservation; Contributions to the diet of fur seals.

Texas Agricultural and Mechanical College, College Station.

Walter P. Taylor.

University of California BS, 1911; Ph.D, 1914; assistant curator of mammals, 1909-1911, curator, 1911-1916; Biological Survey, assistant biologist, 1916-1924; biologist, 1924-1928; senior biologist, 1928-

Member, Phi Beta Kappa, Sigma Xi, American Association for the Advancement of Science, Biological Society of Washington, American Ornithologists' Union (Fellow), Cooper Ornithological Club, American Society of Mammalogists, American Society of Ichthyologists and Herpetologists, California Academy of Sciences (Fellow), Ecological Society of America (President, 1935), Executive Secretary, California Associated Societies for the Conservation of Wildlife (1912-1916); Member, U. S. Department of Agriculture Committee on Federal Migratory Bird Regulations 1914-1916; Member, Committee on Ecology of Grasslands, National Research Council 1932-1934.

Principal papers: Mammals of the Alexander Nevada Expedition of 1909; Field notes on amphibians, reptiles, and birds of northern Humboldt Co., Nevada; The problem of aquatic adaptation in the Carnivora; Description of a new subgenus of Phenacomys; The status of the beavers of western North America; The vertebrate zoologist and national efficiency; Revision of the genus Aplodontia; The Yellowstone elk herds; Suggestions for ecologic investigations in vertebrate zoology; A distributional and ecological study of Mount Rainier, Washington; Life history of the kangaroo rat (with Charles T. Vorhies); Upland game birds in the State of Washington; The present status of the band-tailed pigeon on the Pacific Coast; The basic importance of life history studies; Relation of wild birds to the foot and mouth disease (with H. C. Bryant); The biological side of the business of forest and forage production; Mammals and birds of Mount Rainier National Park; The emergence of the biology of forest and range; How shall we handle our surplus deer?; Provisional list of land mammals of the State of Washington; Research as a basis for wildlife management in the southwestern United States; Methods of determining rodent pressure on the range; The life histories and ecology of jack rabbits in relation to grazing in Arizona (with Charles T. Vorhies); Some animal aspects of reforestation and erosion control; Significance of extreme or intermittent conditions in distribution of natural resources; Some animal relations to soils; Ecology and life history of the porcupine as related to the forests of Arizona and the southwestern States; The significance of biotic communities as related to ecological studies.

Utah Agricultural College, Logan.

D. Irvin Rasmussen.

Brigham Young University BS, 1928; University of Illinois MS, 1930; Ph.D, 1932; Illinois State Natural History Survey, aquatic biological investigations, 1932; wildlife research, 1932-1933; U.S. Forest Service, game management studies, 1929, 1930, 1931; recreational education, 1933; range research, 1934-1935; Utah Agricultural College, wildlife management, 1935; Biological Survey, associate conservationist, 1935-

Member, Phi Sigma, Sigma Xi.

Principal papers: Wildlife and the public domain; Southern California Balanus-Littorina communities; Animal communities of Kaibab Plateau.

Virginia Polytechnic Institute, Blacksburg.

Charles O. Handley.

Washington and Lee University BS, 1922; instructor in biology, 1922-1923, 1923-1924; Virginia Commission of Game and Inland Fisheries, research and educational work, 1928-1935; Biological Survey, assistant in food habits research, 1922, 1923; field assistant in the Cooperative Quail Investigation, 1924-1929; associate conservationist, 1935-

Member, American Ornithologists' Union, Wilson Ornithological Club, Cooper Ornithological Club, Virginia Society of Ornithology (President).

Principal papers: Food habits of the bobwhite quail; Bobwhite quail propagation; Ruffed grouse propagation; Survival of liberated quail; Bobwhite quail preserve management.

NOTES AND NEWS

In the recent reorganization of the Soil Conservation Service, U. S. Department of Agriculture, Secretary Wallace has approved the establishment of a separate unit in the Division of Conservation Operations to integrate a program of wildlife encouragement with operations for soil conservation on the various projects of the Service throughout the country. This is a conservation development of major importance, for the reason that through 139 demonstration projects and the work areas of 501 CCC camps the Soil Conservation Service is bringing under its influence more than 51,500,000 acres of land in 41 different States. The owners and operators of this tremendous acreage are numbered by thousands. The Soil Conservation Service, therefore, has unparalleled opportunity to carry the gospel of wildlife conservation to those in a position really to do something about it - the land owners. It is greatly to be hoped that the Service will make the utmost of its opportunities.

The new Section of Wildlife Management is headed by Ernest G. Holt. Mr. Holt is assisted in the Washington office by Dr. William R. Van Dersal. It is contemplated that the field organization will eventually be directed by 11 Regional Biologists. Those so far appointed are: Warren W. Chase, Des Moines, Iowa, Verne E. Davison, Huron, S. Dak., E. D. Eaton, Albuquerque, N. Mex., Lawrence E. Hicks, Zanesville, Ohio, M. S. McMurtrey, Amarillo, Texas, and Ross O. Stevens, Spartanburg, S. Car.

The Forest Service, U. S. Department of Agriculture, announces the inauguration of a Division of Wildlife Management effective June 1, 1936. Dr. Homer L. Shantz, President of the University of Arizona, has been selected as its first Chief. Dr. Shantz employed previously in the Department (Bureau of Plant Industry, 1908-1926), is an outstanding ecologist and plant geographer. A preliminary announcement by the Forest Service says, "Dr. Shantz will launch an expansive program of critical analyses of conditions, resources, and demands of wildlife on the National forest areas. Under his direction, there will be developed wider management plans for wildlife in coordination with other National forest resources."

The Brewster Medal and honorarium given biennially by the American Ornithologists' Union for the most important published work on American Ornithology issued during the preceding six years was awarded, at the annual meeting in Toronto, Canada, October 1935, to Herbert L. Stoddard for "The Bobwhite Quail, Its Habits, Preservation, and Increase," published in 1931.

Charles H. Batton, in charge of the biological survey unit, Iowa State Planning Board, gives us permission to publish the following information on a doubtful point, the value of osage orange. "In our state-wide upland game feeding program last year, we discovered that we were able to maintain quail on osage orange or hedge apples. In Marion County we fed 2,467 quail by actual count at 175 different feeding stations from middle December until the latter part of February on this feed alone. There is no doubt in my mind, after this demonstration, that the hedge apple provides both solid and salad food to the birds, if crushed and fed under protection. The birds, of course, secured some other feed, but very little as in this particular section of the State the weed seed did not mature due to the drought."

Iowa State College (Ames) has issued a folder "Opportunity in Wildlife Management" which contains matter appropriate to the title, and indicates the courses available in the College that bear on wildlife management, a subject in which a student may major, and also pursue postgraduate work leading to higher degrees.

Buffalo grass may be restored.- "Field experiments at the Hays branch of the Kansas Experiment Station indicate that it may be possible to correct the mistake of the white men who have plowed up too much of the buffalo grass sod, in their zeal to grow wheat and other cultivated crops," says John H. Parker, Bureau of Plant Industry agronomist stationed at Kansas State Agricultural College, in the Agricultural Leaders' Digest for November.

"D. A. Savage, assistant agronomist, reports success in transplanting small pieces of buffalo grass sod in well-prepared soil at intervals of 3 to 4 feet. Such pieces will spread and cover all intervening spaces by the end of the third season, while from 20 to 50 years are required for buffalo grass to become reestablished naturally on abandoned farm land...There is a widespread demand for information on the subject of renewing native grasses on land found to be unprofitable or unsatisfactory for the production of cultivated crops. Many farmers, experiment station agronomists and government experts in land utilization now recognize the mistake made in plowing under so much of the native grass..."

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WILDLIFE REVIEW

AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
ISSUED FOR THE INFORMATION OF COOPERATORS
BY THE
BUREAU OF BIOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF AGRICULTURE

CLEMSON AGRI. COLLEGE
OCT 21 1936
AGRI. REF. DEPT.

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Washington, D. C. No. 3 April, 1936

Conservation: Cooperative, in Ohio

Anon. Cooperative wildlife conservation, Bureau of Scientific Research (Division of Conservation, Columbus, Ohio), Bul. 90, 1935, 6 pp. Mimeographed.

"Intelligent wildlife conservation is based upon the ecology of plants and animals x x x Biological facts, not mere words, count in constructive conservation movements." The great part farms play in wildlife production in Ohio is emphasized. Overfishing more important than pollution in restricting fisheries. Institutions cooperating in wildlife research are listed, and the results of numerous projects briefly summarized. Some of these relate to the food of hawks and owls, the electric incubation and brooding of ring-neck pheasants, a survey of rabbit parasites, and various game bird studies.

Conservation: Status of hawks

Eaton, Warren F. Some notes on the 1935 season, National Assoc. Audubon Societies Circ. (1775 Broadway, New York, N. Y.) 24, 1936, 16 pp.

Especially devoted to field reports on raptorial birds, giving data on individual observations, "vermin" contests, hawk-shooting stands, and bounty payments. The tide certainly is still running against the hawks and aggressive measures tend to favor the Accipiter group to the detriment of the larger and more beneficial species.

Control: Rabbit damage

Anon. Indirect rabbit control, Forest Research Digest (Lake States Forest Exp. Sta., St. Paul, Minn.), February 1935, p. 7. Mimeographed.

Clearing out underbrush in planted areas greatly reduced injury by rabbits. "It is believed that leaving scattered trees or snags as perches for hawks and owls will prove valuable in keeping down the number of rabbits."

Cycles: Snowshoe hare

MacLulich, D. A. Fluctuations in the number of snowshoe rabbits, Forestry Chronicle (Box 43, Knowlton, Quebec, 50 cents a copy), 11(4), December 1935, pp. 283-286, 1 graph. About the same material also in Fluctuations in numbers of varying hares, Science (Science Press, Lancaster, Pa., 15 cents a copy) 83(2146), Feb. 14, 1936, p. 162.

Notes on progress of cyclic phenomena and on parasites and diseases. However "the cause or causes of the decrease have not been determined."

Disease: Gapes

Campbell, James W. The gapeworm (Syngamus) in wild birds, Journ. An. Ecol. (Cambridge Univ. Press, Fetter Lane, E.C. 4, London, England), 4(2), Nov. 1935, pp. 208-215, 4 tables.

1,011 British birds of 53 species examined; gapeworms (Syngamus merulae) were found in 3 species, and S. trachea, the poultry gapeworm, in 8, of which 4 are species occurring in the United States. These are the magpie, starling, English sparrow, and pheasant. For American records see Bul. 140, U. S. Nat. Mus., 1927, and Tech. Bul. 49, U. S. Dept. Agr., 1928.

Disease: Snowshoe hares, etc.

Green, R. G. and J. E. Shillinger. Minnesota Wildlife Disease Investigation (obtainable from Dr. J. E. Shillinger, Biological Survey, Washington, D. C.), Nov. 1935, pp. 78-86, fig. 7, tables 79-81. Mimeographed.

The occurrence of ticks on snowshoe hares has two peaks in a season, namely, in May-June and September-October. The average maximum infestation per individual hare is something more than 4,000 ticks. The previous snowshoe hare decline in the Lake Alexander, Minn., region seems to have been about 1926 or 1927, and another has been observed in 1934 and 1935. Pathological reports are given on 20 snowshoe hares and 3 other mammals and 7 birds.

Disease: Snowshoe hares, etc.

Green, R. G. and J. E. Shillinger. Minnesota Wildlife Disease Investigation (obtainable from Dr. J. E. Shillinger, Biological Survey, Washington, D. C.), Dec. 1935, pp. 87-99. Mimeographed.

Investigation of 18 ruffed and 1 sharp-tailed grouse collected in Minnesota and Wisconsin during a period of decline in numbers yielded little evidence of disease. A group of 25 snowshoe hares from the same area shows gross pathology of the lungs due in part to lungworms, in part to pulmonary tularemia, and in part to unidentified agents. Pathological reports on miscellaneous specimens, 5 mammals, and 8 birds also are given.

Disease: Tularemia

Halliday, C. H. Tularemia, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md., no price quoted), 13(1), 1936, pp. 1-5, 3 figs., 4 tables.

History of occurrence in man and animals; characteristics of the causative organism, Bacterium tularense; symptoms of five types of the disease in humans; treatment; distribution, geographically and also by sexes and ages; prevention and control; unique features; tick paralysis. One of the tables

and a map showing cases reported in Maryland in the years 1928-1935 - eighty-nine in number. This thorough and comprehensive account of tularemia closes with a bibliography of about 20 titles.

Disease: Tularemia

Anon. Case of "Rabbit fever" acquired from pheasants, Science News Letter (Science Service, 2101 Constitution Ave., Washington, D. C., 15 cents a copy), 29(777), Feb. 29, 1936, p. 136.

Tularemia in Minnesota diagnosed and cured by tularemic goat serum at the Mayo Clinic.

Disease: Ulcerative enteritis

LeDune, Emmett K. Ulcerative enteritis in ruffed grouse, Veterinary Medicine (75 East Wacker Drive, Chicago, Ill., 50 cents a copy), 30(9), pp. 394-395.

On a game farm in Ohio; symptoms, post-mortem appearance, control methods.

Ecology: Animal distribution of acorns

Grinnell, J. Why we need wild birds and mammals, Sci. Monthly (Lancaster, Pa., 50 cents a copy), Dec. 1935, pp. 553-556. About the same material under the title Up-hill Planters was published in The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 38(2), March-April 1936, pp. 80-82.

Dependence of oaks upon birds and squirrels for up-hill distribution of their acorns.

Ecology: CCC work

Rutledge, Archibald. Invading the sanctuaries, Field and Stream (578 Madison Ave., New York, N. Y., 25 cents a copy), 40(11), March 1936, pp. 14-15, 54-55, 2 drawings.

The subtitle query, "Are the so-called conservation activities of the CCC detrimental to game?" is answered in the affirmative. Roads constructed to facilitate fire-fighting also increase fire hazards. They impair the sanctuary value of wild places, bring pollution to previously unpolluted waters, and increase the number of hunters. Constructive suggestions are to develop new water supplies, to aid reforestation, and to plant food-producing shrubs and vines.

Ecology: Climatic conditions in relation to bird introduction

Twomey, Arthur C. Climographic studies of certain introduced and migratory birds, Ecology (Prince & Lemon Sts., Lancaster, Pa., $1.25 a copy), 17(1), Jan. 1936, pp. 122-132, 12 figs. (climographs).

Climographs are polygons embracing points determined by two ordinates, one for temperature and one for rainfall, for each unit period used, months in the present instance. Superposed, those for different localities show the degree of coincidence of the climatic factors used according to seasons. Comparing climographs of the native range and the place of proposed introduction is suggested as a test of probable success, for the conclusion is drawn that introduced "birds will perish unless they obtain an optimum both of temperature and precipitation highly similar to those existing in their native habitat at least during the critical time of nesting." A paper published in 1929 (Game birds suitable for naturalizing in the United States, U. S. Dept. Agr. Circ. 96), but not mentioned by Twomey, anticipated his conclusions at least to the following extent: "In the case of a desirable bird, if the rainfall and temperature of its native home can be fairly well matched, it is safe to assume that other conditions can be so altered and controlled as to make them favorable to its naturalization," and "The birds that man has most successfully exploited have chiefly been wide-ranging forms of evident hardiness, having adaptability to a great diversity of environment and to extremes of climate." The bearing of repeated trials upon success of introduction also is not mentioned. Some species have succeeded in areas that were the site of numerous previous failures.

As to migratory species, it is said that those "with a restricted summer range tend to seek the summer optimum of temperature and rainfall in their winter range." In this case the effects of limited numbers and specific sociability may be contributory. The statement that "Migratory birds with a wide climatic tolerance of both nesting and winter ranges are not strongly affected by the two factors of temperature and rainfall" seems only a truism.

Ecology: Drainage operations

Burlington, H. J. The relation of mosquito control in New Jersey to the presence of game on the salt marshes, Proc. 22nd Ann. Meeting N. J. Mosquito Extermination Assoc. (Secretary, Thomas J. Headlee, Dayton, N. J.), 1935, pp. 141-142.

No harmful effect on upland game visiting salt marshes.

Ecology: Drainage operations

Corkran, W. S. The relation of mosquito control to the muskrat industry on the salt marshes, Proc. 22nd Ann. Meeting N. J. Mosquito Extermination Assoc. (Secretary, Thomas J. Headlee, Dayton, N. J.), 1935, pp. 137-141, 2 tables.

Reports opinions of trappers favorable to mosquito-control ditching, gives results of a brief period of test trapping on areas before and after ditching, and notes on habits and food of muskrats in Sussex County, N. J. The favorite foods are reported to be three-square rushes (Scirpus americanus, S. olneyi, S. robustus), cattails (Typha angustifolia, T. latifolia), and needle-grass (Juncus roemerianus). Recommendations are as follows:

"We believe that the minimum width of ditches on muskrat marshes should be 20 inches, and preferably 30 inches or more. The muskrats block the 10-inch ditches with their debris in one season.

"No ditching should be done during the trapping season, but as soon after it as possible. Muskrat houses should not be disturbed. Ditches on muskrat marshes should be cleaned each spring after the trapping season.

"Flood gates should be installed to control the level of fresh water coming on to the marsh from the upland and from rains. Tide gates are needed to exclude high waters backing up particularly salt water."

Ecology: Drainage operations

Headlee, Thomas J. Summary of symposium on the relation of mosquito control in New Jersey to wildlife on the salt marshes, Proc. 22nd Ann. Meeting N. J. Mosquito Extermination Assoc. (Secretary, Thomas J. Headlee, Dayton, N. J.), 1935, pp. 144-146.

Consists mainly of references to the other papers here abstracted, but brings out the point that pyrethrum larvicides now render unnecessary the use of oil or any material that destroys aquatic vegetation. The desirability of improving mosquito control operations in relation to all valuable interests is emphasized.

Ecology: Drainage operations

Urner, Charles A. Relation of mosquito control in New Jersey to bird life of the salt marshes, Proc. 22nd Ann. Meeting N. J. Mosquito Extermination Assoc. (Secretary, Thomas J. Headlee, Dayton, N. J.), 1935, pp. 130-135.

These remarks apply more to marshes having fresh or brackish ponds which may be more or less dried by ditching and not to practically sea level salt marshes flooded at every tide and not dried by the usual mosquito control operations. The statements as to use of oil should be read in the light of Headlee's remark previously noted.

Urner's conclusions are summarized as follows:

"Types of bird life which need low wet marsh of almost full sea salinity with characteristic vegetation, such as Clapper Rail, would not be driven out by ditching such marsh providing its water level, vegetation and salinity were not changed.

"Types of bird life which need brackish ponds and marshes of fairly

constant water level and not directly connected with the tides, such as Pied-billed Grebe, American Coot, Florida Gallinule, Least Bittern, etc., are seriously affected by ditching and driven out by drying.

"The breeding of other species such as Black Duck, Virginia Rail, Willet and some of the Herons, is more or less seriously hurt by ditching and draining of marshes.

"The drying of salt marshes makes them less suitable for shore birds and the change in vegetation of diked salt marsh will eventually drive out most species characteristic of the locality.

"The use of oil on our salt and brackish marsh ponds has two effects on bird life. It kills vegetation and reduces food supply and shelter about open ponds. On open ponds the oil film is not long maintained for it is often promptly blown ashore by the wind. Constant oil applications on breeding grounds require much tramping about, result sometimes in fires and scare off many birds such as breeding ducks.

"Spring burning of marshes is very damaging to the early nesters such as the Black Duck.

"On migration, the numbers of several important species of shore birds and ducks lingering in New Jersey would be greatly reduced by drying of our salt marshes and ponds.

"Establishment of shallow areas open to brackish water at flood tides, on which vegetation and drainage could be controlled would provide feeding areas for hosts of shore birds and many puddle ducks, such as Black, Mallard, Teal, Widgeon and Pintail.

"The opening of diked marsh to the tides after the first killing frosts would under certain conditions render such areas attractive to late shore birds and early migrating ducks.

"The creation of a large swallow population on our salt marshes by providing proper nesting sites during May and June is a phase of mosquito control worth investigating."

Ecology: Economic biology should be comprehensive

Taylor, Walter P. Significance of the biotic community in ecological studies, Quarterly Review of Biology (Williams and Wilkins Co., Baltimore, Md., $1.50 a copy), 10(3), Sept. 1935, pp. 291-307.

The biotic community rather than the animal community alone, or the plant community alone, is the true unit for ecological investigations, corresponding in its development to a complex organism. Discussion of plant and animal interdependencies and of annual and seasonal variation in make-up of biotic communities. Significance of the biome concept in wildlife regulation and in fact in all enterprises in economic biology. Bibliography of 55 titles.

Ecology: Interrelations of range animals

Taylor, Walter P., Charles T. Vorhies, and P. B. Lister. The relation of jack rabbits to grazing in southern Arizona, Journ. Forestry (Society of American Foresters, 839 Seventeenth St., N. W., Washington, D. C., 65 cents a copy), 33(5), May 1935 (April), pp. 490-498, 6 tables, 1 fig.

Stock are primarily responsible for the disappearance of range grasses but jack rabbits, certain other rodents, and grass-feeding insects are more abundant on grazed than on ungrazed areas. Conservative range management will tend to obviate difficulties with these grass consumers as well as with some of the undesirable weeds. Bibliography of 7 titles.

Ecology: Shelterbelt region

Auctt. Possibilities of shelterbelt planting in the Plains Region (Supt. of Documents, Washington, D. C., 75 cents a copy), 1935 (1936), 201 pp. (9x11-1/2), 103 figs., 28 tables, numerous maps.

Geography, climate, ground-water, agriculture, and economics of the shelterbelt region; survey of past plantings; shelterbelt experiences in other lands; native vegetation of the region and planting recommendations. This excellent monograph by 14 authors is indispensable to anyone dealing with trees and shrubs of the area concerned, a 100-mile-broad zone through eastern North Dakota and South Dakota, central Nebraska, western Kansas, and the Panhandle districts of Oklahoma and Texas.

Food Habits: Deer and rabbit damage

Anon. Size of stock in relation to animal injury, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), Feb. 1935, pp. 1-2. Mimeographed.

Both deer and rabbits damage larger sizes of planted trees more than the smaller. Two explanations advanced, greater conspicuousness and larger mineral content.

Food Habits: Deer and rabbit damage

Anon. Rabbit or deer damage?, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), Dec. 1935, pp. 10-12, 2 figs. (photos). Multigraphed.

Description of chief types of damage to forest plantations and illustrations of ordinary browsing cuts.

Food Habits: Fish-eating birds

Cottam, Clarence, and F. M. Uhler. The role of fish-eating birds, Progressive Fish Culturist (U. S. Bureau of Fisheries, Washington, D. C.), 14, Jan. 1936, 15 pp. Multigraphed.

General sketch of the economic relations of fish-eating birds, brief accounts of findings as to certain groups, and suggestions as to methods of preventing depredations. The groups treated include pelicans, double-crested cormorant, kingfisher, great blue heron, green heron, black-crowned night heron, yellow-crowned night heron, other herons, bittern, gulls and terns, water ouzel, osprey, and mergansers.

Food Habits: Fox, red

Hamilton, W. J., Jr. Notes on food of red foxes in New York and New England, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 16(1), Feb. 1935, pp. 16-21, 3 tables.

Report on analyses of 206 fall and winter stomachs from New York and New England, and 66 from Vermont, New Hampshire, and Massachusetts; on food remains in about 31 dens and in 106 droppings. In numerical frequency, mice, rabbits, and fruits are the leading items. Remarks upon the food of foxes from letters and publications are quoted. The summer diet is little known.

Food Habits: Foxes, grey and red

Errington, Paul L. Food habits of mid-west foxes, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 16(3), Aug. 1935, pp. 192-200, 1 table

Report on examination of the stomachs of 236 Wisconsin and Iowa red foxes and grey foxes, upon food items from 113 Iowa red fox breeding dens, and 1175 Iowa red fox fecal samples. Leading food items taken by the Wisconsin foxes were meadow mice and cottontail rabbits. There was "conspicuous preponderance of comparatively slow prey in the fox diet; there was hardly any representation of animals that could be considered as swift." Cottontails and mice ranked high in frequency also in the Iowa stomach contents. Small numbers of pheasants, quail, and chickens were taken. In Wisconsin the poultry consumed was largely carrion. Den studies revealed numerous game birds, poultry, and other birds, besides rabbits, with mice less numerously represented. Examination of feces again revealed both rabbits and meadow mice as favorite groups of prey. Defects of various types of evidence as to food habits are discussed, correlation of studies of den debris and feces presented in tabular form. "Fox food habits seem to be dependent largely on availability of prey. Small mammals evidently constitute staple foods during the greater part of the year." "Foxes ordinarily do not kill large prey." Depredations on poultry can largely be prevented by keeping an active dog. "Material depredations of foxes upon quail - at least in winter - may be more properly regarded as a sympton of species vulnerability than a factor significantly influencing population levels."

Food Habits: Grouse damage to trees

Anon. What factors reduce plantation survival?, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), July 1935, pp. 4-5. Multigraphed.

Among losses in Michigan plantations of 4 species of pine, those from grouse damage are small, apparently not to exceed one percent.

Food Habits: Hawks

McAtee, W. L. Food habits of common hawks, U. S. Dept. Agr. Circ. 370 (Supt. of Documents, Washington, D. C., 5 cents a copy), Nov. 1935 (Feb. 1936), 36 pp., 17 figs., 1 table.

General discussion of predation, and of the basis for economic appraisal of the food habits of hawks. Statements of range and characters for recognition of groups and species, and accounts of the food habits and economic status based strictly on the results of stomach analysis of 17 species.

Food Habits: House cat

Errington, Paul L. Notes on food habits of southern Wisconsin house cats, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(1), Feb. 1936, pp. 64-65.

Data from 50 stomachs indicate mice far in the lead numerically in the prey, 46 being counted; rats 7, rabbits 3, shrew 1; pigeon 1, English sparrow 1, other small birds 1; other items of food, grasshoppers, crickets, June beetles, carrion, and garbage.

Food Habits: Limpkin

Cottam, Clarence. Food of the limpkin, Wilson Bul. (Dr. T. C. Stephens, Sioux City, Iowa, 60 cents a copy), 48(1), March 1936, pp. 11-13.

Analysis of the contents of 30 stomachs confirms published records that the bird feeds almost exclusively upon mollusk flesh. Identified were snails of the genera Ampullaria and Campeloma and mussels of the genus Lampsilis.

Food Habits: Linnet not a weed seed distributor

Roessler, Elizabeth S. Viability of weed seeds after ingestion by California linnets, The Condor (2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 38(2), March-April 1936, pp. 62-65, 3 tables.

Of 40,025 seeds eaten by captive birds, only 7 passed and germinated. "Linnets do not spread weed seeds to any appreciable extent, if at all. On the contrary, each linnet probably destroys about 1000 seeds daily."

Food Habits: Rodent damage in forests

Anon. Investigation of rodent damage, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), March 1935, p. 6. Mimeographed.

Slash on ground following logging apparently favored increase in mouse population. The following year despite a good pine seed crop no reproduction was noted. Severe damage in arboretum plantings traced to harvest mice. Research by T. D. Burleigh of the Biological Survey at the Appalachian Forest Experiment Station.

Food Habits: Rodent gnawing marks

Anon. Bark injury by feeding rodents, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), Jan.-Feb. 1936, pp. 8-9, 3 figs. Multigraphed.

Describes gnawing by porcupines, red and gray squirrels, snowshoe hares, and mice and gives measurements and illustrations of the tooth cuts of porcupine, red squirrel, and the hare.

Food Habits: Rodents vs. rusts

Meilke, J. L. Rodents as a factor in reducing aecial sporulation of Cronartium ribicola, Journ. Forestry (Society of American Foresters, 839 Seventeenth St., N. W., Washington, D. C., 65 cents a copy), 33(12), Dec. 1935, pp. 994-1003, 1 fig., 1 table.

This fungus, cause of the white-pine blister rust, is eaten by various rodents. "The removal of the infected bark in some instances results in a considerable reduction in volume of aeciospores, the spore stage which infects currants and gooseberries (alternate host plants of the rust)." The paper contains a review of the literature (bibliography of 27 titles given) of rodents feeding on the white-pine blister rust, and also on miscellaneous rusts, and other fungi.

Food Habits: Seal, fur

Schultz, Leonard P., and A. Morris Rafn. Stomach contents of fur seals taken off the coast of Washington, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(1), Feb. 1936, pp. 13-15, 1 table.

Of 28 stomachs containing food, 21 yielded remains of squids, 1 of shrimps, 15 of herrings, and 1 of lamprey. Nearly all held parasitic roundworms, the maximum number being 122.

Food Habits: Seal, harbor

Griffin, Donald R. Stomach contents of Atlantic harbor seals, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(1), Feb. 1936, pp. 65-66.

Notes on 4 Massachusetts specimens; food contents entirely fish; alewives and menhaden identified.

Food Habits: Snowshoe hare

Anon. The seasonal food habits of the snowshoe hare, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), May 1935, p. 7. Mimeographed.

Brief report on analyses by Biological Survey of 53 stomachs collected in Minnesota. In spring the diet is a mixture of woody plants and herbs, the former predominating; in summer herbaceous plants and in fall grasses are the chief food; in winter bark becomes the main reliance.

Food Habits: Snowshoe hare

Anon. Woody food preferences of the snowshoe rabbit in the Lake States, Technical Notes (Lake States Forest Expt. Sta., St. Paul, Minn.) 109, Jan. 1936, 1 p. Multilithed.

Among deciduous species, aspen, willows, and birches are preferred but hazel, alder, dogwood, red oak, silver maple, wild rose, cherry, raspberry, and sumac are readily eaten. In the coniferous group jack pine, white pine, and tamarack are preferred, but Norway pine, white spruce, Scotch pine, and white cedar are eaten and even damaged when other food is scarce. The critical period for damage in coniferous plantations includes the fall and winter month

Food Habits: Striped skunk vs. bees

Storer, Tracy I., and Geo. H. Vansell. Bee-eating proclivities of the striped skunk, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 16(2), May 1935, pp. 118-121, 1 fig.

Depredations on apiaries; fencing suggested to exclude the animals, generally of value as to food habits and also for their fur.

Life Histories: California quail

Sumner, E. Lowell, Jr. A life history study of the California quail, with recommendations for its conservation and management, Part II, Calif. Fish and Game (Fish and Game Commission, 450 McAllister St., San Francisco, Calif.), 21(4), Oct. 1935, pp. 275-342, 59 figs.

This concluding part deals with conservation and management. The chief causes of quail decrease are overhunting, destruction of food and cover by clean farming, overgrazing, and fire control, and exclusive use by man of water sources. Recommendations for overcoming influences inimical to quail are discussed under the headings of cover, food, and water requirements and how these essentials may best be maintained and improved. The natural enemies are rather fully treated and emphasis put on the value of cover improvement over vermin control. Hawks of the genus Accipiter are the most destructive predators. Notes are given on the selection of quail refuges, on the annual shootable increase, methods of restocking, methods of trapping, inbreeding, emergency feeding, economic relations. There is an extensive bibliography. Thirty of the illustrations were prepared to facilitate recognition of plants important to the quail. The work has been well done and it provides a foundation for quail management in California comparable to that available in southeastern states as a result of the Cooperative Quail Investigation of 1924-29.

Life Histories: Crested myna

Scheffer, Theo. H., and Clarence Cottam. The crested myna or Chinese starling, in the Pacific Northwest, U. S. Dept. Agr. Tech. Bul. 467 (Supt. of Documents, Washington, D. C., 5 cents a copy)., April 1935 (May), 26 pp., 3 pls. 2 figs., 3 tables.

This introduced species occurs in British Columbia, has been observed in Washington and Oregon but has not yet become established. The appearance and habits of the bird are discussed, the food habits in detail. The myna is aggressive and omnivorous and it is recommended that every precaution be taken to prevent its establishment in the United States.

Life Histories: Deer, white-tailed

Anon. Winter habits of deer, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), July 1935, p. 6. Multigraphed.

A few days' observation on Superior National Forest showed that the animals did not travel far, bedded frequently, and fed chiefly on hazel.

Life Histories: Partridge population factors

Middleton, A. D. Factors controlling the population of the partridge (Perdix perdix) in Great Britain, Proc. Zool. Soc. London 1935(4), Jan. 1936, pp. 795-815, 2 pls., 7 tables. (Reprints probably obtainable from Imperial Chemical Industries Ltd., Millbank, London, S. W. 1, England.)

Report on investigations carried on since 1933 on keepered estates where the Euston system or similar aids but not artificial propagation were employed. Nest and egg mortality is discussed and tabulated. The most important agents of destruction are foxes, farm practices, and rooks. Suggestions are given for recognizing the work of various animal enemies. The average percentage of nests destroyed by all causes is 22. The hatching ratio is almost uniformly high and averages 93 percent. Chick mortality is important but difficult to study. A satisfactory census method is described, however, for birds old enough to be flushed in coveys. Survival varies greatly from year to year but the average young per covey in 25 years on a single estate was 8.4. The percentage of the total stock on this same estate shot in 11 years was 55. The equation of partridge survival must take into account these successive losses: nests, 22%; eggs (failing to hatch), 7%; chicks, 52%; birds shot, 55%; and winter wastage, 40%.

Life Histories: Rabbit, marsh

Tompkins, Ivan R. The marsh rabbit: an incomplete life history, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 16(3), Aug. 1935, pp. 201-205, Pl. 5.

Time of activity, diseases and enemies, tracks, digging, swimming, breeding nest, and young, and economic status. Observations near Savannah, Georgia.

Life Histories: Ring-neck pheasant

McCormick, Robert. Ring-neck pheasant - general habits, Bureau of Scientific Research (Division of Conservation, Columbus, Ohio) Bul. 92, 1935, 3 pp. Mimeographed.

Characteristic range in Ohio for the four seasons; method of spread; size of winter flocks. Pheasants were found in groups up to 362 in number and flocked from December to March. Hungarian partridges were in coveys usually of 16 to 18 birds from September to January.

Life Histories: Small mammals

Townsend, M. T. Studies on some of the small mammals of central New York, Roosevelt Wild Life Annals (Roosevelt Wild Life Forest Expt. Sta., Syracuse, N. Y.), 4(1) [Bul. N. Y. State Coll. Forestry 8(2)], Dec. 1935, 120 pp., 22 figs., 35 tables.

Interesting data on life histories of 3 species of shrews and 6 of mice, gathered in the course of comprehensive trapping operations from which are deduced general conclusions about bait, place, and habitat perception, sex ratios, wandering tendencies, habitat selection, and community relationships. Perhaps of most immediate interest to wildlife managers are figures on population per acre, running over 100 in various habitats. Since birds average only about 2 or 3 to the acre, the suggestion to the abstracter is strong that small mammals may have a much greater economic significance than birds, a matter that to date has received very little attention.

Life Histories: Weight of white-tailed deer

Schoonmaker, W. J. Size and weight of Adirondack deer, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(1), Feb. 1936, pp. 67-68.

Believes the white-tailed deer are as large now as in earlier days. Usual weight of 4-point bucks 160 to 170 pounds; maximum for older bucks 400; usual weight of adult does, 130 to 160 pounds.

Management: Age determination of deer

McLean, Donald. The replacement of teeth in deer as a means of age determination, Calif. Fish & Game (450 McAllister St., San Francisco, Calif., 25 cents a copy), 22(1), Jan. 1936, pp. 43-44, 8 figs.

Replacement of teeth in deer of the genus Odocoileus as a means of definitely determining their age.

Management: Bears on Admiralty Island

Heintzleman, B. F., and H. W. Terhune. A plan for the management of brown bear in relation to other resources on Admiralty Island, Alaska, U. S. Dept. Agr. Misc. Publ. 195 (Supt. of Documents, Washington, D. C., 5 cents a copy), 1934 (January 1935), 20 pp., 3 figs.

A cooperative management plan between the Alaska Game Commission and the Forest Service. The publication includes description of the island, its vegetative cover, forest management, and industries; also relationships and life histories of the bears, estimates of their populations, hunting practices, legal protection, and management.

Management: Cooperative agreement, Forest Service and Biological Survey

[Darling, J. N. and F. A. Silcox.] Agreement between Forest Service and Biological Survey, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), March 1935, pp. 7-8. Mimeographed.

As to forest management and wildlife management on lands controlled by the two Bureaus.

Management: Cover on the farm

Anon. Quail, rabbits, and winter feeding, Outdoor Indiana (State House, Indianapolis, Ind., no price quoted), 3(2), March 1936, p. 12.

Value of asparagus, roses, and blackberries for cover; notes on management.

Management: Deer counting

Anon. Morning versus evening deer counts, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), Jan. 1935, p. 8. Mimeographed.

On 19.2 mile trips during first two hours and last two hours of daylight, twice as many deer were seen in the morning, possibly because of less interference by other observers.

Management: Farm practice in relation to game birds

Anon. Cooperation of landowners necessary to have good Hungarian partridge and ring-neck pheasant hunting in Ohio, Bureau of Scientific Research (Division of Conservation, Columbus, Ohio) Bul. 86, July 1935, 4 pp. Mimeographed.

Half of the losses of nests of Hungarian partridges are caused by farming operations. The circular quotes Yeatter's suggestions as to modification of farm practice. Observations on the fate of Ohio pheasants on the farm and suggestions for improving the admittedly discouraging situation.

Management: Farm practice in relation to game birds

Anon. Wildlife conservation for the "Future Farmers" of Ohio, Bureau of Scientific Research (Division of Conservation, Columbus, Ohio) Bul. 89, 1935, 4 pp. Mimeographed.

Conservation defined as "the intelligent use of our natural resources" "Game should be a secondary farm crop." The necessity of improving cover and food; effects of farm operations on game birds; and suggestions for conserving farm game.

Management: Farmer-sportsman relationships

Anon. The value of shooting rights to the farmers (Imperial Chemical Industries Ltd., Millbank, London, S.W. 1, England), 7 pp., 7 figs.

In Great Britain, it is stated, from 12 to 75 cents per acre can be realized for shooting rights. Suggestions are given as to management with special reference to the grey or Hungarian partridge. Excerpts: "there ought to be a harvest of game with as much justification as a harvest of crops." "The interests of game are x x x akin to the interests of good farming." "The partridge is undoubtedly the bird of first importance to the farmer."

Management: Feeding upland game

Conklin, W. Gard, and James N. Morton. More food for upland game, Board of Game Comrs. (Harrisburg, Pa.) Bul. 11 rev., 37 pp., 16 photos, 14 other figs., 1935.

Trees and shrubs valuable in feeding game; planting of feed patches; construction and maintenance of feeding stations; special suggestions for winter aid for about 10 species of wildlife.

Management: Food and cover plants for waterfowl

Generosoff, V. T. The culture of food and cover plants for waterfowl (All-Union Cooperative Associated Publishing Office, Leningrad, U.S.S.R.), 1934, 128 pp., 48 figs., 17 tables.

This publication is entirely in Russian; the following much condensed abstracts of the chapters and the accompanying comments were prepared on the basis of a translation by V. Rimsky-Korsakoff employed for the purpose by the Division of Migratory Waterfowl of the Biological Survey:

CHAPTER I, pp. 7-27, treats of general conditions affecting the development of aquatic vegetation. References are given to several Russian works on limnology, of which "Life in Fresh Waters", by A. N. Lipin, State Publication Office, 1926, is especially recommended for game managers. Most of the chapter is taken up by an ecological discussion in which the distribution, and particularly the zonation, of marsh and aquatic plants in response

to environmental factors, are outlined. The deepest zone contains such genera as Chara, Ceratophyllum, and Fontinalis, permanently submerged plants. The next group, plants that live under water but project their flowers above it for pollination, is exemplified by Potamogeton and Elodea. Of a third group, floating-leaved plants, Nymphaea, Nuphar, and Lemna, are cited. A fourth or emersed association includes Scirpus, Phragmites, Equisetum, Typha, Sagittaria, and Polygonum amphibium.

Comments.--The genera, and in great part the species also, are the same for Russia as for America. The object of this chapter is to inform the game manager as to the effects of heat, light, water, and soil on aquatic plant distribution and development, especially in relation to transplanting and acclimatization for the use of waterfowl. In effect the chapter is a brief outline of aquatic plant ecology.

CHAPTER II, pp. 28-52, is devoted to exposition of a method of appraising the productive capacity of waterfowl areas. The author points out the desirability of making surveys before alterations in food or cover conditions are planned. If a large-scale map is available so much the better, if not, one should be made by the simplest means. On this chart should be indicated the shore line and the boundary between the littoral and pelagic aquatic plant zones, and by symbols the distribution of important vegetation in the delimited areas. The necessary traverses can be made by boat, kept on lines by compass steering and using any available landmarks as points of departure. Distances can be roughly estimated by a sort of "pacing", so many short, rather rapid strokes of the oars to a hundred meters. Stakes and buoys can be used for more accurate surveys. A few typical profiles also should be run from points on the shore as far back as nesting cover occurs down through the submerged plant zones.

The composition of the vegetation of any given section of the area surveyed is estimated on a decimal basis. Thus a marsh might be composed of Phragmites 4 parts, Scirpus 3, Typha 1, and Carex 2. Water plants are similarly estimated, as for example Potamogeton 5, Sagittaria 3, and Nymphaea 2. The estimating can be done from a boat moving at moderate speed (5 to 6 kilometers per hour). Knowing the areas involved and the percentage composition of their vegetation, it is easy to compute the approximate acreage stands of any plant species or group of species. To obtain quantitative data, actual counts are made of plants on meter quadrats in growths of medium density.

Although some appraisal of animal food resources would be very desirable, it is impracticable for rapid surveys and is taken into consideration only as casually noted by the individual observers. Final appraisals of areas were based on grades summed up from 5, 3, and 1 point awards made on the basis of relative adequacy of (1) food supply, (2) ordinary cover, (3) nesting cover, and (4) refuge capacity (that is, freedom from harmful or disturbing factors). These four indices of the value of an area for game management were based not only on the presence, quality, and distribution of vegetation, but also upon the entire complex of natural and economic factors noted by the observers. As

these may vary with the season, surveys at different times of year may be required.

Comments.--The object of the appraisal surveys is to enable the preparation of inventory maps showing the principal features affecting ducks, the location of duck-producing areas, the waste spaces, and the tracts having potentialities for improvement. Such maps not only show the game manager what areas may be improved and how much they stand in need of amelioration, but also, from the data given, as to the more satisfactory tracts, indicate the prospects for success in improvement and suggest leads of action in the way of imitating natural conditions on the better parts of the environment.

CHAPTER III, pp. 53-68, deals principally with food plants of waterfowl and tabulates previously published results on analyses of the stomach contents of 347 Russian and more than 8,000 American wild ducks. Results from the latter material are available in the United States in reports by McAtee, Mabbott, and Kubichek. The Russian data are quoted from Tichvinsky, who found the principal seeds eaten to be those of Sparganium, Potamogeton, Scirpus, Carex, Rumex, Nymphaea, and Polygonum, and the vegetation to be chiefly the tubers of Sagittaria and the entire plants of duckweeds.

Generosoff points out the bearing of the results of stomach analyses upon consideration of plants to be used in environmental improvement, but indicates that in Russia emphasis will be placed upon the encouragement of native rather than on the introduction of exotic species. The suggestion of Professor Mal'tsev is mentioned that the ancestral forms of some cultivated plants, because of their adaptability to unfavorable conditions and their power of self-sowing, may be especially valuable for establishment of the desired perennial cultures for feeding wildlife. The objection is realized that cultivation of weedy species may not be desirable in proximity to farm crops and should not be attempted except with the consent of all concerned. Wild forms of buckwheat, hemp, oats, millet, sunflower, quinoa, soybean, and lupine are possibilities mentioned. Experiments with plot cultures are suggested to test the value of various foods and to learn under what conditions they will be most fully utilized by waterfowl.

Comments.--Corrections may here be suggested for some of the author's remarks on the American duck-food studies. The percentages given are not of weight but of volume. Generosoff thinks that animal food because of its less resistant nature is generally underestimated. This is questionable, however, as foliage is no more resistant than flesh, and mollusk shells are more enduring than seeds. The author thinks that hard seeds, as those of Sparganium, should be classed as a mechanical element of the food and that they are erroneously considered by American investigators as being a type of food that is assimilated. Such seeds are regularly ground up, however, and equally hard fructifications of cypress and hickory trees are an important element of the subsistence of wild ducks in southern wooded swamps. "The analysis of the stomachs of American ducks revealed very few grains of cultivated cereals; however, this gives no cause for the assertion that these foods are of no

importance (either actual or potential) in the food of water game. In many places the ducks cause considerable damage to grain crops, and especially in the steppe region in Siberia." Surely no American investigator has wittingly made such a statement regarding grain feeding, for similar cases of damage are well known in this country.

CHAPTER IV, pp. 69-97, is entitled "Propagation of food and cover plants". While admitting that nearly all of the basic data on food plants for wildfowl and publications on their propagation are American, the author thinks the problem has been treated in a one-sided manner. Neglect of cover plants is one reason for this charge, and overemphasis upon the planting of wildrice, another.

Comments.--As to the former, it may be replied that the neglect has not been total, and the need for information on cover plants has not been great. As to the latter allegation, there must be a misunderstanding, for wildrice is allotted only 6 pages out of a total of 66 in Biological Survey publications on propagation of wild duck foods, and the local and seasonal importance of the plant is well understood. In view of his critical remark, it is interesting to note that Generosoff devotes to wildrice 12 pages out of a total of 29 in his chapter on propagation. This chapter is based almost entirely on official documents and dealers' catalogs published in the United States and Canada and contains very little information on Russian plants or conditions.

GENERAL CONCLUSIONS, p. 98, in brief are:

1. The propagation of food and cover plants for waterfowl is an urgent problem in game management in the USSR.

2. If actually put into effect, it will (a) increase the productivity of duck areas and make possible the utilization of lands now barren, thereby increasing game; (b) it will not require large expenditures; nor (c) a highly paid staff, since it can be carried on by local groups of hunters under supervision of game specialists and botanists.

3. The propagation of food plants for waterfowl on a large scale is an important problem in game management and must therefore be carried out according to a definite plan, including (a) reconnaisance surveys of the wildfowl areas of the USSR in order to locate the most important places, (b) carrying out detailed surveys of these areas, (c) collecting duck stomachs on a large scale for scientific food-habit studies, and (d) organizing research work on production areas looking primarily toward the propagation of local food and cover plants and secondarily to the acclimatization of plants from other countries and from other regions of the USSR.

Management: Land economic inventory in Wisconsin

Bordner, John S., et al. Land economic inventory of the State of Wisconsin (Division of Land Economic Inventory, Capitol Bldg., Madison, Wis.), No. 2, Rusk County, 1935, 52 pp., 12 tables, 11 maps, 11 figs. Separate brochure of 26 township cover maps.

The economic inventories of Wisconsin will serve as a partial basis for any wildlife management that may be attempted. Of special interest in this number are pp. 35-47 reporting on a survey of aquatic plants in relation to wildlife.

Management: Land planning for wildlife

National Resources Board. Planning for wildlife in the United States, Supplementary report of the Land Planning Committee, Pt. IX (Supt. of Documents, Washington, D. C., 10 cents a copy), 1935, pp. v+24 (quarto), 9 tables, 2 figs.

An important report on federal participation in land planning for wildlife, past, present, and projected. A detailed abstract would require too much space but the section and subsection headings cited here will give a good idea of the contents of the report. Section I, Requirements for wildlife areas: Economic importance of wildlife, Social and recreational importance, Need of wildlife management, Possibilities and limitations in associating wildlife with other uses of land, Public areas employed as specialized refuges, Public areas designated as refuges but devoted to other major uses, Public areas needed for specialized refuges, Public areas in other uses that should be designated as wildlife refuges, Private lands employed as a habitat for wildlife. Section II, Policies with respect to wildlife: Areas now in public ownership devoted to wildlife, Programs of acquisition; suggestions for modification, Integration of Federal and State policies, Encouraging game production on private lands. Section III, Wildlife management in national forests: Encouraging game management on public land in other use, Economic and social values of wildlife areas, Wildlife and other land uses, Areas suitable only for refuges, Areas specially adapted to wildlife, Areas available for wildlife, Needed additions to forests, Privately owned land as a habitat for wildlife.

Management: Land planning in Illinois

Frison, T. H. Utilization of Illinois lands for forestry, wild life, and recreation, Trans. Ill. State Acad. Sci. (State Natural History Survey, Urbana, Ill., no charge), 27(1), Sept. 1934 (1935), pp. 33-38.

Effects of settlement on natural conditions; value of fish and game; license fees in 1932 indicated one angler to each acre of water, and one hunter to each 118 acres of land; necessity of conservation and planning forestry, wildlife, and recreation, under the guidance of scientifically acquired data of an impartial character.

Management: Niobrara wildlife refuge

Arundson, Geno A. Facts about Niobrara big game reserve, Outdoor Nebraska (State Game, Forestation, and Parks Comm., Lincoln, Nebr., no price quoted), 11(1), Feb. 15, 1936, pp. 4, 12.

History, description, and brief account of the plants and animals of this federal wildlife preserve.

Management: Opening woodland

Bump, Gardiner. Wanted, more desirable woodlands, Outdoor America (1167 Merchandise Mart, Chicago, Ill., 10 cents a copy), N. S. 1(2), Dec. 1935, pp. 4-5, 11, 3 photos.

The value of openings and forest margins stressed. Seven times as much game found in natural mixed cover as in areas reforested with conifers. Results of experimental slashings given.

Management: Pennsylvania experience

Biddle, Nicholas. Wildlife management by state agencies, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 6(12), March 1936, pp. 3, 20.

Brief statement of revenues and expenditures of Pennsylvania game and fish departments. There are 192 game refuges totalling 132,804 acres on available state hunting lands embracing 2,750,000 acres (ratio about 1:20). Failure to keep deer herd under reasonable control has impaired the environment for these animals and also for grouse, snowshoe rabbits, and other terrestrial forest species. Plans for remedial treatment. Plantations on occupied deer range promptly devoured. On farmer-sport relationships it is noted that efforts to get flushing bars used have met with little success, no feasible way has been found to secure alteration of farm practice in the interest of wildlife, and few sportsmen favor paying for hunting privileges.

Management: Planting

Aldous, C. M. Game food planting, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), Sept. 1935, pp. 8-9. Multigraphed.

Successful sowing of wildrice and experimental planting of clovers in Chippewa National Forest, Minnesota.

Management: Planting

Anon. Storage of seed after acid treatments, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), Jan.-Feb. 1936, pp. 10-12. Multigraphed.

On storage after treatment with acid to overcome seed dormancy. Honeylocust, sumac, and soapberry can be stored dry at 51° F. for five months; Kentucky coffeetree seeds showed a gradual decrease in germination during storage after treatment.

Management: Planting

Shirley, Hardy L. Seed extraction, storage, and testing in Central Europe (Lake States Forest Expt. Sta., St. Paul, Minn.), March 1936, 2 pp. Multilithed.

Relates mostly to seeds of conifers.

Management: Planting. Black locust seed gathering

Kellogg, Leonard F. Collection, extraction, and yield of black locust seed, Central States Forest Expt. Sta. (Columbus, Ohio), Station Notes No. 28, Feb. 1936, 5 pp., 1 table. Mimeographed.

Suggests collecting from trees with desirable characteristics; notes on methods and feasible rates of picking; threshing; and yield of pods and seeds. In Ohio the yield of seeds is about a fourth of the weight of the pods.

Management: Planting. Black locust seed threshing

Myer, Ben F. A home-made thresher for black locust seed pods, Central States Forest Expt. Sta. (Columbus, Ohio), Station Notes No. 27, Feb. 1936, 3 pp., 1 fig. Mimeographed.

Description and illustration of apparatus for threshing black locust pods in small lots.

Management: Planting. Seed scarifier

Anon. The Denbigh seed scarifier, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), Dec. 1935, pp. 4-5, 1 fig. Multigraphed.

Plans, specifications, and description of a scarifier for seeds having exceptionally heavy seed coats. A leaflet, Technical Notes No. 106, Jan. 1936, 1 p., Abrasives used in scarifying forest tree seeds, issued by the same Station, supplements the article abstracted, by discussing 5 kinds of abrasives, and the results obtained.

Management: Propagation of game food plants

Robbins, P. W. Propagation of trees and shrubs for game food, Agr. Expt. Sta. Quarterly Bul. (State College, East Lansing, Mich.), 18(1), Aug. 1936, pp. 35-37, 2 tables.

Red-osier dogwood (Cornus stolonifera) cuttings survived to a satisfactory degree both when planted unrooted in nature, and in a solar frame. Serviceberry (Amelanchier canadensis) also was successful in the latter test but not in the former, while basswood (Tilia americana) survived neither. The red-osier is thus suitable for economical increase of browse and fruit for wildlife.

Management: Wildfowl sanctuary

Robl, Frank W. My game refuge, Outdoor America (1167 Merchandise Mart, Chicago, Ill., 10 cents a copy), N.S. 1(2), Dec. 1935, pp. 8-9, 4 photos.

A tract of 16-1/2 acres enclosed with a 6 foot fence of one-inch mesh at bottom. Two acres water supplied by a windmill from a well drilled for the purpose. Land area planted to wheat, alfalfa, and a few trees and shrubs, near Ellinwood, Kansas; quite successful.

Management: Woodlot refuges

Steen, Edwin B. The farm woodlot as a bird refuge, Outdoor Indiana (Dept. of Conservation, State House, Indianapolis, Ind., no price quoted), 3(2), March 1936, pp. 2, 25, 1 photo.

General remarks on value of birds, protection from enemies, provision of nest boxes, supplementary feeding, and woodlot practices.

Propagation: Ring-necked pheasant

Anon. Instructions for hatching, feeding and the care of pheasants, Bureau of Scientific Research (Division of Conservation, Columbus, Ohio), Bul. 55, 1935, 4 pp. Mimeographed.

Concise directions as to care of adult pheasants and of the brooding hen, nest and eggs, nest box, and rearing coop, and as to feeding chicks, both by dry and moist mashes, home made and commercial.

Propagation: White-tailed deer

Gerstell, Richard. Breeding experiments with the whitetail deer, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 6(12), March 1936, pp. 4, 20, 2 photos.

Tests continued three years in a 23-acre enclosure where the animals had natural browse and supplementary feed showed that one whitetail buck can successfully mate with seventeen does. About a fourth of the does bore twins. In sire-daughter matings no ill effects of inbreeding were noted.

Research: In Wisconsin

Leopold, Aldo. Wild life research in Wisconsin, Trans. Wis. Acad. Sci. Arts & Letters (Separates obtainable from the author, University of Wisconsin, Madison), 29, 1935, pp. 203-208.

Brief historical sketch of ornithological and other wildlife investigations in Wisconsin; work of Stoddard, Errington, and others in the State; research and its application; bibliography of 14 titles.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-30. Economic ornithology and the correlation of laboratory and field methods, by Clarence Cottam, January 1936, 13 pp., 1 fig.

The particular merits of field and of laboratory studies, and the desirability of combining them; description of analytical methods; illustration of equipment; bibliography of 9 titles.

BS-32. Raising badgers in captivity, January 1936, 2 pp.

Description of the animal, pens, dens, food requirements in captivity; notes on breeding.

BS-33. Forestry and game management, by Herman H. Chapman, Yale School of Forestry, January 1936, 4 pp.

The place of game in the multiple use forest program; necessity of coordinating all interests; foresters must be in charge on forest areas; needs of wildlife; effects of management and lack of it on animal populations; correlation with forestry practice; degree of management economically feasible.

BS-34. Raising raccoons, January 1936, 2 pp.

Selection of ranch site; methods of constructing pens and dens; food requirements in captivity; notes on breeding and management.

BS-35. Raising muskrats, February 1936, 2 pp., bibliography of 6 titles.

Describes areas suitable for rearing the animals; gives reasons why pen raising is not profitable; notes on methods of fencing marsh areas and on breeding and pelts; bibliography of 6 publications relating to muskrat production.

BS-36. Publications on fur and fur animals, January 1936, 2 pp.

Restricted to available official publications of the Biological Survey.

BS-37. The correlation of forestry and wildlife management, by Ira N. Gabrielson, February 1936, 8 pp.

Suggests increased wildlife education in forestry schools; modification of timber cutting, tree planting, and stand improvement practices; adjustment of views of wildlife conservationists; application of existing knowledge pending further research.

BS-38. Cooperative research in wildlife management--a summary of the project to February 15, 1936, by I. T. Bode, February 1936, 16 pp.

Cooperation between States, the Biological Survey, and American Wildlife Institute; table of States and land grant colleges involved; list of project teachers; objectives of the program; tentative plans for each region under the headings of investigational work, trial demonstration and management areas, and educational work.

BS-39. Report on the Arnett, Oklahoma, Experimental Quail and Prairie Chicken Management Project, by Verne Davison; abridged by W. L. McAtee, March 1936, 6 pp.

Explanatory introduction; notes on site; summary of life history findings for the lesser prairie chicken and the bobwhite quail; results of management studies in trapping, planting of feed patches, use of fire, and on water requirements and predators. Comment on introduction of Mexican quail, misconceptions of hunters, and on free hunting.

BS-40. An automatic drinking fountain for minks, by Charles F. Bassett, March 1936, 3 pp., 5 figs.

Home-made device automatically regulating the water supply and preventing its pollution.

GAME RESEARCHES OF IMPERIAL CHEMICAL INDUSTRIES, ENGLAND

Imperial Chemical Industries Ltd., makers of British sporting ammunition, have embarked upon a five-year research into game conservation problems with the principal objective of improving methods of partridge management. A leaflet explaining the nature and objects of the plan may be obtained from the company at Millbank, London, S. W. 1, England. The Foundation has issued 11 Advisory Leaflets briefly abstracted below and a series of supplemental papers on various game topics, any of which desired no doubt also can be obtained upon application. Director, Major H. G. Eley; Collaborators, Captain H. B. Moser, Edgar Page, and A. D. Middleton.

The supplemental papers are: The Hungarian partridge in captivity, The shooter's calendar, The value of shooting rights to the farmer (abstracted on p. 16), Woodpigeons - how to kill them, Grey squirrels - how to kill them,

Trespass notices, and Some suggestions by the Bureau of Animal Populations for the co-operation of private estates in game research. The Advisory Leaflets are:

No. 1 - The treatment and release of imported Hungarian partridges, January 1935, 4 pp.

Description of holding pen and care of birds recovering from the hardships of transportation. Suggestions for amalgamating them with the wild stock.

No. 2 - Partridge coverts, sanctuaries and nesting sites, January 1935, 4 pp.

Selection of site, fencing and planting of small coverts; care and planting of sanctuaries; preservation of natural nesting sites.

No. 3 - Partridges: Winter feeding, grit, dust and drinking trays, January 1935, 4 pp.

Use of winnowings and tailings for winter feed; mixture formula given including olive oil "to help keep the birds warm and make their jackets waterproof"; selecting feeding stations; supplying grit; dusting shelters and items to add when adopted; dew pan drinking trays.

No. 4 - Some notes on the hand-rearing of partridges, January 1935, 8 pp. and a folded plate illustrating "The closing of the wing bars in partridge chicks."

Provision of insect food; suggestions as to foster mothers, management of rearing fields, and supplying staple necessities as dust, grit, water, and food; instructions as to feeding according to age of chicks; description and illustration of plumage changes according to age; merging of broods into the wild stock.

No. 5 - The "Knebworth" system of maintaining a wild partridge stock, January 1935, 4 pp.

A substitute for the Euston system involving mainly the allotment of not more than 12 eggs to a pair of partridges.

by A. D. Middleton.

No. 6 - Periodic fluctuations in British game populations,/Reprint from Journ. Animal Ecol. 3(2), Nov. 1934, pp. 231-249, 13 figs., 6 tables.

Tabulation of the kill for long series of years of rabbits, hares, weasels, partridges, grouse, and woodcock on estates where there was no artificial propagation but as complete suppression of predatory forms as possible. Graphs reveal periodic fluctuation in the population of all of these species. Of interest as indicating lack of effect of "vermin" control on periodicity.

No. 7 - Partridges and artificial manures, January 1935, 4 pp.

Artificial fertilizers do not decrease insect populations, hence presumably are not deleterious to partridges; experiments planned.

No. 8 - The ant egg and its secret, February 1936, 6 pp.

Ant "eggs", really pupae, long considered almost indispensable as a food for partridge chicks were analysed; their value is not in vitamin but in fat content; how to use suet and milk as a substitute; flour moth caterpillars also promising.

No. 9 - How to distinguish sex and age in partridges, February 1936, 7 pp., 5 pls.(half-tone figs.]

Wing coverts of male have a pale longitudinal stripe, of female that stripe and cross bars in addition; first year birds have the outermost primary pointed, adults have it rounded; other tests as flexibility of lower mandible and breastbone.

No. 10 - How to brail a bird, February 1936, 5 pp., 6 diagrams.

Description and illustration of brails and method of applying them. [Brails are wing hobbles to prevent flight.]

No. 11 - The treatment and care of broodies, February 1936, 6 pp.

Selection, general care, disinfection; use of dummy eggs; care of nest boxes; number of eggs per nest; food and feeding-times; not too much time off the nest should be permitted; emergency use of incubator.

SPECIAL ARTICLES

Work of the Division of Forage Crops and Diseases in relation to wildlife management

This Division of the Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C., is interested in legumes and other forage plants from the standpoint of hay or pasturage. It is realized that the seeds of many of these plants as sorghums, lespedezas and others are utilized by game birds and other wildlife, and in some cases the growing crop may make a more or less satisfactory cover.

In the bulletins that have been issued by the Division, emphasis has been laid upon culture and the uses of the plants other than for wildlife. The Division of Forage Crops and Diseases will be very glad, however, at any time, to give advice and information on such matters as culture, source of seed, and similar subjects within its province.

Bulletins now available for free distribution are herewith listed with brief comment on the plants they treat, especially in relation to wildlife.

COWPEA

Cowpeas: Culture and varieties, by W. J. Morse, U.S.D.A. Farmers' Bulletin 1148, 18 pp., illus. 1924.

These are too well known to warrant much mention. They are summer crops and probably seldom leave much in the way of seed for birds except as some seed may fall to the ground. The seeds of most kinds rot quickly on the ground but a few such as the iron cowpea last fairly well into the winter.

CROTALARIA

Crotalaria, a new legume for the south, by Roland McKee and C. R. Enlow, U.S.D.A. Circular 137, 30 pp., illus. 1931.

The species most commonly used for soil improvement on sandy soils in the south produce seed that is not wholesome for wildlife. There are, however, other species which are now coming into use somewhat, which provide excellent forage and of which the seed presumably will be good for game birds. These crops are essentially for sandy lands. Seed generally matures as far north as Wilmington, N. Car., but not much farther.

LESPEDEZA

Lespedeza, by A. J. Pieters, U.S.D.A. Leaflet 100, 8 pp. 1933.
Farm practice with lespedeza, by H. A. Miller, Bureau of Agricultural Economics, U. S. D. A. Farmers' Bulletin 1724, 17 pp., illus. 1934.

There are two classes of lespedezas - annual and perennial. The seeds of all lespedezas are much utilized by quail and other granivorous birds. In good soil the annual lespedezas may make growth high enough to afford cover but upon poor and dry land the growth would hardly be high enough. Lespedeza sericea, on the other hand, which is a perennial, affords ideal cover and the seeds hang on to the plants to some extent almost throughout the winter. When well grown this lespedeza reaches a height of from 18 to 36 inches and the seed may largely be out of reach of ground birds. Some of it, however, falls from time to time and becomes available. Other lespedezas not described in any of our publications are the shrubby forms as L. bicolor and others of that type. Under favorable conditions these form shrubs from four to six or more feet in height. At Experiment, Georgia, the branches, to a large extent, survive the winter and they become three or four years old. At the Arlington Farm near Washington the growth is killed down every winter but new growth comes from the crown. Here quail have been observed to be extremely fond of the seed, which is produced in reasonable abundance. A hedgerow of this lespedeza would form an invaluable source of seed for quail.

PROSO

Proso or hog millet, by John H. Martin, Division of Cereal Crops and Diseases, U.S.D.A. Farmers' Bulletin 1162, 12 pp., illus. 1929.

This as well as the other millets is an annual plant which can be cultivated over most of the eastern part of the United States and will provide excellent seed for game birds.

SORGHUM

Growing and utilizing sorghum for forage, by H. N. Vinall and R. E. Getty, U.S.D.A. Farmers' Bulletin 1158, 32 pp., illus. 1932.

Sorghums are too well known to require much comment. They are hot weather plants and can be sown anywhere in the eastern United States though in some sections of the south it is very difficult to get a crop of grain because of weevil injury and bird depredations.

SOYBEAN

Soybeans: Culture and varieties, by W. J. Morse, U.S.D.A. Farmers' Bulletin 1520, 33 pp., illus. 1927.

Soybeans are grown throughout the United States except in the semi-arid regions. They can be grown in these regions also with a minimum of water, the greatest difficulty connected with their culture being that the crop is very palatable to rabbits and may be destroyed before the farmer can utilize it.

SUDAN GRASS

Sudan grass, by H. N. Vinall, U.S.D.A. Farmers' Bulletin 1126, 21 pp., illus. 1935.

This is an annual that is widely grown in the eastern United States as an emergency hay or grazing crop. Seed is produced mainly in Texas, Oklahoma, and Kansas; as grown in the east the crop is not ordinarily allowed to seed. It could, however, be matured to produce a supply of seed for game birds if desirable.

VETCH

Vetch culture and uses, by Roland McKee and H. A. Schoth, U.S.D.A. Farmers' Bulletin 1740, 22 pp., illus. 1934.

These are common winter cover crops throughout the eastern part of the United States. The plants are seldom allowed to grow long enough to produce seeds; the commercial supply of seed is grown mainly in Oregon but to some extent also in Michigan. In the East the crop is usually turned under while in bloom.

WHEATGRASS

Crested wheatgrass, by H. L. Westover, U.S.D.A. Leaflet 104, 8 pp., illus. 1934.

This is a crop for the north and northwest semi-arid regions where it is one of the very best hay and grazing crops. Seed is produced abundantly when the plant is not grazed too closely and probably makes a desirable food for game birds.

The Williamston feed patch seed mixture

In "Suggestions for Pheasant Management in Southern Michigan" (1933), Professor H. M. Wight recommended, from more than 50 plants tested, a restricted list of those found most satisfactory for feed patch growth. This list filled a great want and has been copied far and wide, probably without due regard to differences in climatic conditions. It would seem desirable in the case of all regions outside of southern Michigan to consult the nearest Agricultural Experiment Station for advice as to the particular strains of the seed producers best to use in each locality, as well as for information about methods of preparing the seedbed, desirability of fertilizing, time of planting, etc.

The plants especially recommended by Professor Wight were: "Sudan grass, early maturing sorghums, various true millets (especially White Wonder and German), proso (the high growing varieties being the best), Siberian millet, various buckwheats (including Japanese, Michigan hybrid, silver hull, and Tartarian), hemp, flax, corns, cowpeas, and soy beans."

He remarks that, "Although sunflowers provide a good food, they are usually taken by other birds so that in many localities they are of little value for pheasants." During an inspection of the Williamston Project, Professor Wight explained that blackbirds are especially attracted by the sunflowers and that coming in large numbers they not only consume all of the sunflower seed, but also take an undue proportion of the product of other plants in the feed patch.

Experience in the northern plains states indicates that there is nothing better that can be done for pheasants than to leave corn standing in the fields during the winter. In this case also consumption of the grain by other birds is a factor to be taken into consideration. Where crows are abundant, patches of standing corn must be large or the crows may harvest the whole crop.

Since the 1933 report, suggestions for a feed patch seed mixture have been prepared by Professors Wight and English. The 1934 revision is here quoted:

Plant	Percent of mixture by weight
Buckwheat	12.6
Proso, Early Fortune	4.2
Millet, White Wonder	4.5
Millet, Common	4.5
Millet, Tennessee German	4.5
Sorghum, Early Amber	8.4
Sudan Grass	14.0
Sunflower, Mammoth Russian	2.8
Soy Bean, Manchu	4.2
Soy Bean, Ito San	4.2
Cowpeas, New Era	8.4
Flax	8.4
Hemp	8.4
Feterita	3.2
Corn, Golden Glow	7.7
	100.0

Professor Wight recently (March 13, 1936) writes "We found that low seeding rates were more successful on all soils and sites than the higher rates, and my notes indicate best results with a rate not exceeding 20 lbs. per acre. Therefore, I am advising a seeding rate of 15 to 20 lbs. per acre."

"It may seem that the amounts of corn, sorghum, proso, soy beans, and sudan grass are out of proportion to the usual seeding rate advised for the various seeds, but because of the need of covering several of the seeds so lightly, there is necessarily a considerable waste of those seeds that require deeper seeding. For this reason we have advised a heavier proportion of such seeds in the mixture. Incidentally, the surplus seed not covered is an attraction to birds and was used by pheasants, quail, and song birds quite generally in the Williamston food patches."

"I now consider a patch of corn in which soy beans and sunflowers have been planted and which is cultivated and grown until early July and then planted with buckwheat and sudan grass the best food patch."

For the benefit of those who may wish to vary the formula, seeding rates calculated for maximum seed production for the various crops when sown individually are appended. These were furnished by Roland McKee of the Division of Forage Crops and Diseases of the Bureau of Plant Industry. Buckwheat 45 lbs.; corn, 12; cowpeas, 30; flax, 35; hemp, 40; millet, 30; milo, 5; proso, 40; sorghum, 5; soy beans, 20; sudan grass, 25; sunflower, 10.

In the case of milo, sorghum, soy beans, and sunflower the rates are for sowing in rows. For broadcasting in pure stands they might be doubled; in any event to insure heavy seed production, it is better to err on the side of thin as opposed to thick sowing. It may be well also to keep down the representation of tall growing plants so that the effects of shading on the lower, but equally valuable, seed producers will not become too marked.

BIOLOGICAL BIBLIOGRAPHIES

Sporting magazines and conservation department organs

[It will be appreciated if those noting omissions of currently published journals will arrange for sample copies of the publications concerned to be sent to Wildlife Review.]

Of general scope

The American Field. Weekly, $5.00 a year, single copy 15 cents. The American Field Publishing Co., 222 W. Adams St., Chicago, Ill.

American Wildlife. Bi-monthly, $2.00 a year, single copy 25 cents. American Wildlife Institute, Investment Bldg., Washington, D. C.

Field and Stream. Monthly, $2.50 a year, single copy 25 cents. 578 Madison Ave., New York, N. Y.

Fish & Game News of America. Semi-monthly, $2.00 a year, single copy 5 cents. Becket, Mass.

Fur-Fish-Game. Monthly, $1.50 a year, single copy 15 cents. 174 East Long St., Columbus, Ohio.

Game Breeder and Sportsman. Monthly, $2.00 a year, single copy 20 cents. Game Conservation Society, Inc., 205 E. 42nd St., New York, N. Y.

Hunter-Trader-Trapper. Monthly, $2.00 a year, single copy 25 cents. Columbus, Ohio.

Modern Game Breeding and Hunting Club News. Monthly, $2.00 a year, single copy 25 cents. J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa.

National Sportsman. Monthly, $1.00 for 2 years, single copy 10 cents. 404 N. Wesley Ave., Mount Morris, Ill.

Outdoor America. Monthly, $1.00 a year, single copy 10 cents. Izaak Walton League of America, 1167 Merchandise Mart, Chicago, Ill.

Outdoor Life. Monthly, $2.50 a year, single copy 25 cents. Popular Science Publishing Co., Inc., 353 Fourth Ave., New York, N. Y.

Outdoors. Monthly, $1.00 a year, single copy 15 cents. 413 Pleasant St., Beloit, Wis.

Sports Afield. Monthly, $1.00 a year, single copy 15 cents. Mount Morris, Ill.

The Sportsman. Monthly, $4.00 a year, single copy 50 cents, 10 Ferry St., Concord, N. H.

Sportsman's Review. Weekly, $1.00 a year, single copy 5 cents. Sports News Publishing Co., 33 West 42nd St., New York, N. Y.

Sportsmen's Review. Weekly, $4.00 a year, single copy 15 cents. 22 East 12th St., Cincinnati, Ohio. [Devoted almost exclusively to trapshooting.]

Of local scope

Alabama Game and Fish News. Monthly, 50 cents a year, single copy 10 cents. Department of Conservation of Game, Fish, and Seafoods, Montgomery, Ala.

The Alaska Sportsman. Monthly, $1.50 a year, single copy 15 cents. Ketchikan, Alaska.

Hoofs and Horns, including Arizona Wild Life. Bi-monthly, $1.00 a year. 121 E. 10th St., Tucson, Ariz.

California Fish and Game. Quarterly, $1.00 a year; single copy 25 cents. Fish and Game Commission, 450 McAllister St., San Francisco, Calif.

Pacific Sportsman. Monthly, $2.00 a year, single copy 25 cents. 401 Sansome St., San Francisco, Calif.

The Delaware Sportsman. Quarterly, single copy 15 cents. Delaware Game and Fish Protective Association, Wilmington, Del.

Outdoor Florida. Monthly, $1.00 a year, single copy 10 cents. Florida Growers Press, Inc., 1306 Grand Central Ave., Tampa, Fla.

Outdoor Indiana. Monthly, no price quoted. Department of Conservation, State House, Indianapolis, Ind.

Bulletin. Monthly, mimeographed. Game and Fish Commission, Frankfort, Ky.

Louisiana Conservation Review. Quarterly, no price quoted. Department of Conservation, New Orleans, La.

Maryland Conservationist. Quarterly, no price quoted. Game Division of the Conservation Department, 512 Munsey Bldg., Baltimore, Md.

Michigan Conservation. Monthly, 25 cents a year. Department of Conservation, State Office Bldg., Lansing, Mich.

The Northern Sportsman and Resorter. Monthly, $1.00 a year, single copy 10 cents. Guelff Printing Co., Marquette, Mich.

The Minnesota Conservationist. Monthly, $1.00 a year, single copy 15 cents. Department of Conservation, State Office Bldg., St. Paul, Minn.

Western Wild Life. Monthly, $1.00 a year, single copy 10 cents. Billings, Mont.

Outdoor Nebraska. Quarterly, no price quoted. Nebraska State Game, Forestation, and Parks Commission, Lincoln, Neb.

New Mexico. Monthly, $1.00 a year, single copy 15 cents. State Bureau of Publications, 208 W. Gold Ave., Albuquerque, N. Mex.

New York Conservationist. Monthly, $1.00 a year, single copy 10 cents. 367 High St., Lockport, N. Y.

North Dakota Outdoors. Monthly, mimeographed. Game and Fish Department, Bismarck, N. Dak.

The Ohio Outdoor News. Monthly, 50 cents a year, single copy 5 cents. Circleville, Ohio.

Pennsylvania Game News. Monthly, 50 cents a year, single copy 5 cents. Board of Game Commissioners, South Office Bldg., Harrisburg, Pa.

Pennsylvania Outdoors. Monthly, $1.00 a year, single copy 10 cents. The Pocono Press, Cresco, Pa.

The Tennessee Sportsman. Monthly, $1.00 a year, single copy 10 cents, Tennessee Sportsman Publishing Co., Nashville, Tenn.

Great Southwest Skeeter and Sportsman. Monthly, $1.50 a year, single copy 15 cents. 700 Rockwood St., Dallas, Texas.

West Virginia Wild Life. Monthly, $1.00 a year, single copy 15 cents. Newspaper Bldg., Fairmont, W. Va.

NOTES AND NEWS

A national program for wildlife restoration, presented by Ira N. Gabrielson, Chief, Bureau of Biological Survey, U. S. Department of Agriculture, at the American Wildlife Conference, Washington, D. C., February 7, 1936, was summarized briefly in the following paragraphs:

1. Land for the restoration and use of wildlife. The Federal Government has a national responsibility to complete a migratory waterfowl program and where necessary to develop primary areas for the preservation of other wildlife.

2. Closer cooperation between Federal and State agencies. (a) By extending cooperative research and demonstration units now operating in nine States. (b) Federal cooperation with States, even to financial aid, in developing State wildlife management areas that will supplement the primary Federal areas.

3. Recognition of wildlife values. Land management agencies, both public and private, should be brought to recognize the value of wildlife and induced to provide for its needs so far as compatible with other uses.

4. Pollution of waters must be stopped or reduced to a non-destructive point.

5. Research on wildlife problems should be expanded to meet the new problems produced continually by modern developments. The results of this research should be freely available to all land administrators and wildlife management agencies.

6. Closer coordination of the activities of Federal land administrative agencies.

7. Basic protective legislation, and regulations drawn to meet the needs of wildlife, not merely the wishes of groups of special interests.

In a publication recently distributed by The Upper Peninsula Development Bureau, Marquette, Mich., entitled "The Upper Peninsula Forest Experiment Station, What It Is, What It Does," we are informed that "In cooperation with the U. S. Biological Survey, through its forest biologist assigned to the Station, studies are being carried on of the benefits and injuries to the forest caused by the snowshoe rabbit, deer, porcupine, woodchuck, beaver, and birds. Methods are being developed to control the first of these which at times of great abundance may become very destructive to young coniferous plantations."

During the American Wildlife Conference held in Washington, D. C., February 3-7, 1936, a preliminary organization, the Society of Wildlife Specialists, was effected of persons professionally interested in wildlife management. This action was prompted by the conviction that there is need in this rapidly growing profession for an agency to define and maintain standards for the work and workers, to affiliate for the common good all subscribing to those standards, and to consider the feasibility of establishing a periodical devoted to wildlife management.

Officers of the preliminary organization, elected at a meeting of more than a hundred persons, are: President, Ralph T. King of the Minnesota Agricultural Experiment Station; First Vice-President, Ernest G. Holt of the U. S. Soil Conservation Service; Second Vice-President, Miles D. Pirnie of the Michigan State College of Agriculture, and Secretary-Treasurer, W. L. McAtee of the U.S. Biological Survey.

Aldo Leopold of the University of Wisconsin and Herbert L. Stoddard of the Cooperative Quail Study Association of Thomasville, Ga., are Counsellors to the President. A regional Advisory Board also has been appointed by the President, consisting of N. W. Hosley, Harvard Forest, Petersham, Mass.; Gardiner Bump, State Conservation Department, Albany, N. Y.; Ross O. Stevens, U. S. Soil Conservation Service, Spartanburg, S. Car.; E. A. Schilling, U.S. Forest Service, Atlanta, Ga.; Rudolf Bennitt, University of Missouri, Columbia; T. H. Langlois, Bureau of Fish Propagation, Columbus, Ohio; Harry Adams, U.S.

Forest Service, Milwaukee, Wis.; W. P. Taylor, U. S. Biological Survey, College Station, Texas; Paul L. Errington, Iowa State College, Ames; J. Stokley Ligon, Carlsbad, N. Mex.; Arthur S. Einarsen, U. S. Biological Survey, Corvallis, Oreg.; Joseph Dixon, National Park Service, Berkeley, Calif.; George L. Girard, University of Wyoming, Laramie.

Col. Lewis S. Thompson died on his plantation - Sunny Hill - in southern Georgia on March 25, 1936. Col. Thompson was the principal organizer and moving spirit of the committee of sponsors for the Cooperative Quail Investigation carried on from 1924 to 1929, the results of which were published in two preliminary reports and in a final publication in book form "The Bobwhite Quail, its habits, preservation and increase," by Herbert L. Stoddard and collaborators. Col. Thompson again was chiefly instrumental in organizing the Cooperative Quail Study Association in 1931 to continue certain lines of inquiry started in the original investigation, and in securing the return of Mr. Stoddard to be its Director. He was a man of broad human understanding and full of good deeds modestly done.

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WILDLIFE REVIEW

AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
ISSUED FOR THE INFORMATION OF COOPERATORS
BY THE
BUREAU OF BIOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF AGRICULTURE

OCT 21 1936
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Washington, D. C. No. 5 September, 1936

Biological Survey

Bailey, Vernon. The mammals and life zones of Oregon, U. S. Dept. Agr., N. A. Fauna 55 (Superintendent of Documents, Washington, D. C., 75 cents a copy), 416 pp., 52 pls., 101 figs. (maps), 1 colored map (life zones), Aug. 29, 1936.

Outlines basic data for the work; discusses the life zones and lists their characteristic birds, mammals, and plants. The annotated list of species, which makes up the bulk of the work, gives for each form, synonymy, type locality, description, distribution, and habitat. The range in the State is indicated for most forms on small maps, and the breeding habits, food habits, and economic status of many of the species are discussed. There is a glossary of Indian names of mammals, a long bibliography, and full index.

The publication is dated June 1936 but was not published until August 29, a circumstance over which the author had no control. The gap between the nominal and the actual dates of publication in this case is not as great as has been exemplified by various recent productions of the Government Printing Office. The practice is one for which nothing favorable can be said and it is further one that should not be tolerated in the case of publications like this N. A. Fauna, that contain names new to zoological nomenclature, knowledge of the exact date of publication of which is of the utmost importance to science.

Conservation

Henderson, W. C. Value of wildlife conservation, American Planning and Civic Annual, 1935 (American Planning and Civic Association, Union Trust Bldg., Washington, D. C., $3.00 a volume), pp. 40-41.

Annual catch of fur animals formerly worth $65,000,000, now reduced to $20,000,000. Measures required for restoration.

Conservation

Lloyd, Hoyes. Canadian waterfowl conservation, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md.), 13(3), Summer Issue 1936, pp. 5-7, 3 figs.

Migratory Birds Treaty and its effect on waterfowl conservation. Enforcement agencies in Canada; cooperation between Dominion and Provincial officials. The Canadian sanctuary program. Waterfowl decline in a hundred years, and rainfall in the prairie provinces from 1928 to 1935 inclusive are depicted in graphs, and a map outlines the drought area and shows the sources of the continental duck supply in relation to flyways and the winter range.

Conservation

Pough, Richard. Pennsylvania and the hawk problem, Pennsylvania Game News (State Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 7(4), July 1936, pp. 8, 23, 2 photos.

Analyzes hawk protection by States, and notes that Pennsylvania specifically exempts from protection and lists on hunting licenses and thereby encourages the killing of certain hawks protected in other States. The State should be a good neighbor and bring its laws into agreement with the findings of scientific research.

Control: Bulb pests

Scheffer, Theo. H., and F. E. Garlough. Rodents and moles as pests in bulb plantings, U. S. Dept. Agr. Circ. (Supt. of Documents, Washington, D. C., 5 cents a copy) 381, 16 pp., 9 figs., Feb. 1936.

Brief sketch of bulb industry in Pacific Coast States, of the mammals known to damage bulb plantings, and of the various types of bulbs destroyed. Control methods are treated under the heads of preventive measures, trapping, and poisoning.

Control: Cotton-rat

Carr, Carlyle. Cotton-rat control in Florida, University of Florida (Gainesville) Agr. Extension Circ. 41, 8 pp., 4 figs., March 1936.

Readers of "The Bobwhite Quail: its habits, preservation and increase" will remember that Stoddard found the cotton-rat to be a fairly important consumer of quail eggs. The animal is of more consequence, however, as an agricultural pest. Experiments in control methods are described and summarized. A sliced sweet-potato bait, with the poison (strychnine) and other ingredients dusted on the surface, is recommended.

Control: Coyote

Anon. Practical predator control, featuring coyote trapping, New Mexico Dept. Game and Fish (Santa Fe, N. Mex.), 1936, 16 pp., 2 pls., 6 figs.

"The coyote, menace to game and livestock in mountainous areas, has reached a point in New Mexico where all interests must cooperate to curb it." Notes on habits of the coyote, and the use in control procedure of lures and traps.

Control: European rabbit

Dollman, Guy. The rabbit menace, Natural History Mag. (British Museum, London, S.W. 7, England, 1 shilling a copy), 5(39), July 1936, pp. 297-311, 5 photos.

Destructiveness of the rabbit in Australia and in Great Britain, where also it is an introduced species. "One estimate of the annual damage done by rabbits in Great Britain puts the figure as high as 70,000,000 pounds sterling." Description of damage and of methods of control in both countries. Fumigation with hydrocyanic acid gas formed by calcium cyanide flakes introduced into burrows by a blower is most effective. Discussion of the practicability of obtaining control by the use of a disease - Myxomatosis cuniculi.

Control: Damage to forest plantings

Rudolf, P. O. Lessons from past forest plantings in the Lake States, Lake States Forest Experiment Station (St. Paul, Minn.), 6 pp. multilithed, and front cover, Aug. 1936.

Grouse, deer, rodents, and rabbits destructive to plantations; snowshoe hare the worst offender. These animals when numerous may prevent successful planting in brushy areas. Organized hunts may help to control their numbers. Changing cover conditions and leaving stubs to attract hawks and owls also are helpful measures. Deer damage can be held down by regulating deer populations so that they do not overtax the carrying capacity of the range and by maintaining stands of the best browse plants.

Control: Field-mice and rabbits

Hamilton, W. J., Jr. Field-mouse and rabbit control in New York orchards, Cornell Agricultural Experiment Station Extension Bul. (Ithaca, N. Y.) 338, Sept. 1935, 23 pp., 10 figs.

In severe winters meadow-mice damage may cost orchardists of the State $500,000. Details of damage, habits of the mice, control methods (mechanical barriers most effective), encouragement of natural enemies. Briefer treatment of the rabbit problem.

Control: Rodents

Butcher, Fred D. Control of ground squirrels and other rodents in North Dakota, North Dakota Agricultural College (Fargo) Extension Circ. 142, 4 pp. (8-3/4 x 4), April 1936.

Notes on species in the State, damage done, and methods of control of ground squirrels, prairie dogs, pocket gophers, field mice, rats, and house mice.

Control: Vermin

Brumback, Lynn H. Quail conservation, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md.), 13(3), Summer Issue 1936, pp. 15-16.

The author recognizes the necessity of preserving brood stock and of conserving cover and food, but does not discuss these matters, dealing almost

entirely with control of natural enemies. The treatment is fairer than the average of such disquisitions but pole traps are recommended. The Cooperative Quail Investigation is quoted on various points but the fact is left unstated that its field leader does not approve the use of pole traps. Blue jays eat the eggs and molest newly hatched young, yet their mobbing of snakes aids in finding these egg-eating reptiles. One is reminded that crows hung up for scarecrows can no longer glean insects after the plow. Emphasis usually is placed on vermin control but it is not the most important step that can be taken to aid game bird populations and distinctly is not the first that should receive attention.

Cycles

Gillette, Halbert P. The cycles that cause the present drought. A paper read June 26, 1935, at the Annual Meeting of the American Meteorological Society, 5 pp., 3 figs., 1 table, apparently privately published. The author's address is 400 W. Madison, Chicago, Ill.

Tree-rings, varves, intervals between moraines, are Nature's "rain-gages" and they "roughly record annual rainfall variations over periods of time so much greater than man has recorded weather, that they furnish, by all odds, the best data for solving cyclic problems." Combining much of the existing data (a bibliography of 20 titles is given), the author concludes there is a major precipitation cycle of 152 years, 1 month, with its next minimum in 1939, and a lesser one of 69-2/3 years, the last minimum of which was in 1934. These two cycles explain the present drought and indicate that its severe effects will persist for at least 15 years longer. The author draws conclusions unfavorable to shelter-belt and reforestation projects. "We are in the middle of one of those long dry periods so often mentioned in history, which in olden times caused famines, migrations, and wars. Averaged by decades, rainfall in general will be subnormal for about 40 years." These findings have a scientific basis and even if not accepted in full as presented, at least should be further studied. The eventual conclusions certainly should be taken into consideration in connection with public policies, among which those relating to migratory waterfowl come readily to mind.

Cycles

Wing, Leonard W. The role of cycles in conservation, American Wildlife (American Wildlife Institute, Investment Bldg., Washington, D. C., 25 cents a copy), 25(3), May-June 1936, pp. 39-40, 1 photo.

In Wisconsin the loss of game in the downward phases of the cycle may be 35,000,000 head. The author seeks to show the economic importance of cyclic phenomena as a reason to be understood by the "practical" minded, for support of research. "Until a more thorough understanding of cycles is reached, until greater knowledge of cycles is available, plans dealing with wildlife conservation evolve in the dark and their practicability and application are fraught with grave uncertainty."

Cycles: Snowshoe hare

Cox, Wm. T. Snowshoe rabbit migration, tick infestation, and weather cycles, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(3), Aug. 1936, pp. 216-221.

Suggests that ticks increase in dry, decrease in wet, years, and may have more to do with fluctuations in snowshoe hare populations than has yet been established. Migrations of the animals that can quickly alter local population densities also may be stimulated by heavy tick infestations. The article contains an account of conspicuous predation by owls on a migratory horde of the rabbits. Notes are given on a migration of porcupines, and brief references to those of a few other mammals.

Destruction of wildlife: By arsenicals

Chappellier, A., et M. Raucourt. Les traitements insecticides arsenicaux, sont-il dangereux pour le gibier et pour les animaux de la ferme? [Are arsenical insecticides dangerous to game and livestock?] Annales des Epiphytes etc. (Ministry of Agriculture, Paris, France), N.S. 2(2), 1936, pp. 191-239, 27 tables.

In laboratory tests, minimum lethal doses of arsenic per kilogram of live body weight were determined as follows:

	Lead arsenate	Calcium arsenate	Aluminum arsenate	Paris green
Rabbit	40 mg.	24 mg.	22 mg.	13 mg.
Partridge	60.6 mg.	13.8 mg.	----	10.6 mg.

The dosage is said to be about the same for the domestic rabbit, the wild rabbit, and the hare. Larger amounts were required to kill when administered along with normal diet, and smaller total quantities if divided and given daily. Experimental trial did not result in poisoning domestic rabbits by feeding them with plants treated with the ordinary arsenical mixtures. Data are presented on the elimination of arsenic in urine and feces. The amount of arsenic carried by potato beetles and their larvae killed by the insecticide was determined and the conclusion reached that it is very improbable that the grey partridge is ever poisoned by consuming these insects in the field. Analyses were made of the liver and muscle of rabbits, hares, and partridges killed by arsenic; they do not contain sufficient arsenic to injure the consumer.

Field work included far-reaching inquiries and the gathering of specimens for analysis. The authors summarize (in part):

"Experience as to the susceptibility of game to insoluble salts of arsenic (lead arsenate, calcium arsenate, Paris green), and the findings of laboratory tests, bring us to the conclusion that the poisoning of hares,

rabbits, and partridges as a result of the treatments usually applied in combatting the potato beetle is altogether exceptional.

"The cases of mortality of game that have been pointed out have scarcely yielded a single verification of poisoning. In any event they are few and correspond in no way to the hecatombs of game reported in the press. The number of carcasses found does not exceed what would be expected from normal mortality.

"Despite an appeal sent out to all of the Departments we have received during the period of use of arsenicals only 11 carcasses of game animals and poultry. Toxicologic investigation permits us to assert that none of these were poisoned by arsenic. Several cases of poisoning of large animals, notably cattle, have been cited; they appear undoubtedly due to negligence or malice.

"So far as man is concerned the only mishaps we have noted have been passing indispositions due to imprudence of those applying the arsenicals.

"In combatting the potato beetle we should not forget that arsenic is a poison, and we should also not forget that certain elementary precautions are required to use it without danger to man and domestic animals, and that if under exceptional circumstances, game animals succumb their death does not in any way menace the future of the chase.

"The poisoning of game by insecticides is insignificant compared to poaching, and the improvidence of hunters." (pp. 231-2)

There is a bibliography of 23 titles, 4 of them in English.

Disease: Bird parasites

Cram, Eloise B. Species of Capillaria parasitic in the upper digestive tract of birds, U. S. Dept. Agr. Tech. Bul. (Supt. of Documents, Washington, D. C., 5 cents a copy) 516, 27 pp., 12 figs., May 1936.

Nematodes infesting chiefly galliform and anseriform birds; classification, description, illustration, pathology; lists of hosts.

Disease: Deer anemia

O'Roke, Earl C. Sickle-cell anemia in deer, Proc. Soc. Exp. Biol. and Medicine (The Griffiths Press, 100 Liberty St., Utica, N. Y., 75 cents a copy), 34, 1936, pp. 738-9, 1 fig.

This disease, apparently the same as one known in humans, has been diagnosed in deer in California and Michigan. "It is possible that sickle-cell anemia may be a factor, in addition to malnutrition, starvation, and lungworm pneumonia, in the cause of the winter losses of deer in Michigan."

Disease: Duck sickness

Twomey, Arthur C., and Sarah J. Twomey. Selenium and duck sickness, Science (The Science Press, Lancaster, Pa., 15 cents a copy), 83 (2159), May 15, 1936, pp. 470-471.

Experimentally, it was shown that low concentrations of selenium in drinking water produce poisoning in ducks with symptoms identical with those of botulism. In comment it may be said that apparent selenium poisoning of wild ducks has been reported from Wyoming where soils derived from selenium-bearing shales are so common. The subject deserves careful field investigation.

Disease: Eel-grass

Stevens, Neil E. Environmental conditions and the wasting disease of eel-grass, Science (Lancaster, Pa., 15 cents a copy), 84 (2169), July 24, 1936, pp. 87-89, 1 fig.

Suggests that northward movement of a great mass of warm water in response to declination of the moon may have provided conditions favorable for the eel-grass disease. The periods of extreme northern declination of the moon appear to coincide with those of known serious shortage of eel-grass.

Disease: Elk

Mills, Harlow B. Observations on Yellowstone elk, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(3), Aug. 1936, pp. 250-3.

Reports on examination of animals killed in the process of herd reduction. Percentage of pregnancy of 129 females was 74.4; no twins. Notes on external and internal parasites, and diseases. By way of summary it is stated that of the various maladies, 3 are transmitted by contact of the animals, one is due to a flying insect, one to a tick that perches on vegetation, and 6 are associated with poor grazing conditions. Of the 11 diseases, transmission of 9 is greatly aided by overcrowding and by feeding on overgrazed range.

Disease: Gapes

Beaudette, F. R. Gapeworm disease, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 20 cents a copy), 40(7), July 1936, pp. 147, 160-161.

A popularized account; the main point of interest to the wildlife manager is that the pheasant seems to be the only game bird seriously affected. Treatments for gapeworms are discussed; the most efficient seems to be mechanical removal.

Disease: Poultry

Buckley, John S., Hubert Bunyea, and Eloise B. Cram. Diseases and parasites of poultry, U. S. Dept. Agr. Farmers' Bul. (Supt. of Documents, Washington, D. C., 10 cents a copy) 1652, 69 pp., 28 figs., revised April 1936.

Of interest to breeders of game birds as in many cases the diseases, their symptoms and treatment are about the same in their charges as in poultry. The general sections on disease prevention, control, and eradication, and on disinfectants and their application also should be of value.

Disease: Snowshoe hare, etc.

Green, R. G., J. E. Shillinger, and Carl L. Larson. Minnesota Wildlife Disease Investigation (Dr. J. E. Shillinger, Biological Survey, Washington, D. C.), March 1936, pp. 126-140, tables 94-98; April 1936, pp. 141-158, tables 99-104; May 1936, pp. 159-180, tables 105-109, mimeographed.

These three issues are devoted largely to an account of shock disease (spontaneous hypoglycemia) of snowshoe hares. The symptoms, death rate, chemistry of the blood and urine, blood counts, varying quantities of liver lycogen, and experimental treatments are discussed in considerable detail, and there is a general account of the malady and its import especially in relation to the population cycle.

An article by Ralph L. Dowdell entitled "Toxicity of Arsenic for Ducks" in the March Report concludes that "the amount of arsenic found in commercial shot is in a dosage entirely non-toxic for ducks" either by absorption from shot imbedded in tissues or from those swallowed. Each of the Reports contains data on progress of the Lake Alexander Investigation of snowshoe hares, their diseases, and parasites, and also statements as to the results of autopsies of miscellaneous specimens.

Disease: Spotted fever

Halliday, C. H. Rocky Mountain spotted fever with special reference to the disease in Maryland, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md.), 13(2), Spring Issue 1936, pp. 3-7, 6 figs., 5 tables.

Another authentic and thorough account of an animal borne disease by this author (see Wildlife Review No. 3, April 1936, pp. 3-4, for abstract of his account of Tularemia). In the East the cottontail rabbit is the main animal carrier, but in the West numerous mammals, mostly rodents, are involved. The vectors are ticks, and in the East apparently only in comparatively recent years has the ordinary wood or dog tick become infected. In Maryland there were reported 237 human cases from 1930 to 1935, 18 of them fatal. Dr. Halliday's account gives attention to the history of knowledge of the disease, identification of the cause, its occurrence in nature, animal

reservoirs, transmission, life cycle of the tick vectors, seasonal and occupational incidence in humans, distribution by age groups and sex of victims, symptoms, diagnosis, pathology, and control. There is a bibliography of 15 references.

Disease: Sylvatic plague

Meyer, K. F., Chairman, Report of the Sylvatic Plague Committee. Seventh Ann. Meeting Western Branch, Amer. Public Health Assoc. (presumably obtainable from Dr. K. F. Meyer, Hooper Foundation, San Francisco, Calif.), 10 pp., mimeographed, 1936.

Plague occurs not only in rats but also in wild rodents and the two types of epizootics give rise to different human epidemics. The disease in wild rodents is called sylvatic plague; its vectors are various species of fleas. Sylvatic plague may act as a population regulator of certain rodents showing population cycles. This disease has been definitely identified in various rodents in California, Oregon, and Montana. Plans for cooperative work in study and control of the infection.

Disease: Tularemia

Moilliet, T. K. Review of tularemia in British Columbia, with special reference to a recent human case, Canadian Entomologist (R. H. Ozburn, Agricultural College, Guelph, Ont.), 68(6), June 1936, pp. 121-124.

Important stages in the history of knowledge of tularemia. The snowshoe rabbit as a host; tick and other carriers; incidence of the disease in carnivores, particularly the common cat. Bibliography of 12 titles.

Ecology

Clements, Frederic E. Experimental ecology in the public service, Ecology (Prince & Lemon Sts., Lancaster, Pa., $1.25 a copy), 16(3), July 1935, pp. 342-363.

Although this paper makes no reference to wildlife, it contains a condensed synopsis of ecology and its applications that will be stimulating and useful to conservation biologists. There is a definition of ecology, and something on methods and instruments, and on fields of application. In the last-named section, land classification and use, grazing and the public domain, shelter-belts and wind-breaks, run-off and erosion, and natural landscaping, are discussed.

Ecology: Animal inter-relationships

Tubbs, F. F. Woodchucks may aid the rabbit supply, Michigan Conservation (State Office Bldg., Lansing, Mich.), 5(12), May 1936, p. 4, 1 photo.

Woodchuck population too much reduced. The animals are of value in making burrows providing shelter for rabbits, and should be allowed to come back to reasonable numbers.

Ecology: CCC work

Howard, William J. Restoration of roadside cover by the C.C.C., Wilson Bul. (Sioux City, Iowa, 60 cents a copy), 48(2), June 1936, pp. 101-103, 1 pl.

Grading and planting to improve scenery along an Illinois thoroughfare promises benefit to wildlife, particularly through increase in cover. An example that, it is to be hoped, will be followed elsewhere.

Ecology: Census methods

Chapman, Floyd B. Censusing game species in the field, Ohio Division of Conservation (Columbus, Ohio), Bul. 125, 1 p., mimeographed, July 1936.

Three methods of getting information on kill from hunters; requiring reports; contacting gunners at random in the field; close checking on sportsmen entering and leaving definite areas.

Ecology: Forests and wildlife

[Bordner, John S.] The relation of forestry to wild life, State of Wisconsin, Division of Land Economic Inventory (Capitol, Madison, Wis.), Bul. 3, pp. 32-34, 5 figs., Jan. 1936.

Lesson XX in a bulletin without general title, discusses forests and forest policies in relation to animals; and swamps, streams, and lakes as wildlife habitats; also maintenance and improvement of these homes for wildlife.

Ecology: Jack rabbit populations

Mohr, W. P., and Carl O. Mohr. Recent jack rabbit populations at Rapidan, Minn., Journ. Mammalogy (Dr. Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(2), May 1936, pp. 112-114, 1 fig.

Population data for white-tailed jack rabbits correlated with climographs for 13 years. Numbers vary from a few to more than 69 individuals per square mile, the most prevalent number falling between 10 and 20. Growing seasons were dry during the years when the hares were abundant, wet when they were less numerous.

Ecology: Mosquito control operations

Gabrielson, Ira N. Information needed for a proper understanding of the effects of mosquito control work on the wildlife of tidal marshes, Proc. 23rd Ann. Meeting, N. J. Mosquito Extermination Assoc. (Dr. Thos. J. Headlee, Sec'y., Agr. Exp. Sta., New Brunswick, N. J.), 1936, pp. 156-163. Also issued separately and repaged, 1-8.

The Biological Survey while recognizing the necessity of mosquito control opposes the needless destruction of wildlife habitat. The Bureau is

carrying on an intensive investigation of the effects on wildlife of the various methods employed in mosquito control. The complicated ecology of mosquito habitat is being studied and experiments under way are intended to bring out the effects on that ecology of the operations usually employed in anti-mosquito campaigns. The bulk of the paper is taken up by a discussion of the principal salt-marsh plants, their value to wildlife, and the effects on them of changes in water level, salinity, and other factors.

Ecology: Overpopulation of deer

Leopold, Aldo. Deer and Dauerwald in Germany. II. Ecology and policy, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(5), May 1936, pp. 460-466, 2 tables.

Due to overpopulation by deer and the prevailing system of silviculture, preferred browse foods no longer occur in German deer forests except under fence. Details are given as to this deficiency and description of the artificial feeding it necessitates. Damage to the forests by deer also is discussed. The ratio of kill to population varies from 18 to 38 percent. Tables empirically classify German deer browse as to relative palatability and show the density of game populations in relation to the degree of overbrowsing. Suggested American applications of the information are offered. Bibliography of 18 titles.

Ecology: Starling roost killing trees

Young, Vernon A. Edaphic and vegetational changes associated with injury of a white pine plantation by roosting birds, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(5), May 1936, pp. 512-523, 4 figs., 5 tables.

At the New York State College of Forestry, most of the trees in a small white pine plantation died as a result of starlings roosting in them two seasons. The birds damaged or entirely knocked off some of the needles, and their copious droppings increased nitrogen, phosphorus, and potassium compounds in the soil to such an extent as apparently to upset the physiological reactions of the trees and cause their death. Seeds deposited by the starlings germinated and produced luxuriant ground vegetation. The tables show frequency of occurrence of various species and their mortality from competition. The tone of the article is perhaps unduly pessimistic.

Ecology: Territory

Palmgren, Pontus. Die Vogelbestände zweier Wäldchen, nebst Bemerkungen über die Brutreviertheorie und zur quantitativen Methodik bei Vogelbestandaufnahmen. [The bird populations of two small woods with remarks on the nesting territory theory and upon quantitative methods in surveying bird populations.] Ornis Fennica (Zoological Museum, University of Helsinki, Helsingfors, Finland), 10(3-4), 1933, pp. 61-94, 9 figs., 2 tables.

Based on studies carried on systematically for 2 years, and more casually during a third year, of the bird population of a pine wood and a birch wood in Finland. Corresponding with American experience, the author found the coniferous wood to average 1.35 birds per hectare in 1926 and 1927, and the deciduous, 4.92. The writer finds that birds may use only part of their territory in a given day, and another part in a following period, that birds of different pairs regularly forage in an entirely friendly manner over the same territory, and that territories are over-ridden by pressure of numbers; hence he believes the territorial theory has been carried further than is justified by the facts.

He found the actual enumeration of the birds difficult and refers sympathetically to Nicholson's assertion that in wooded country with a high density of bird life, about 40 acres is quite as much as a single observer can cover. He counted the birds by repeated inspections of narrow strips, each bird observed being marked down on a map, and the sex noted. He points out that singing males holding territory may be present but not mated. The number of singing males therefore does not accurately indicate the number of pairs. In commenting on the bearing of this fact upon American census methods, the author says it is not a serious criticism as the presence of these males occupying territories shows the capacity of the area for accommodating birds. Bibliography of 12 titles, 6 in English.

Ecology: Winter bird population

Van Deventer, Wm. C. A winter bird community in western New York, Ecology (Lancaster, Pa., $1.25 a copy), 17(3), July 1936, pp. 491-9, 3 figs., 2 tables.

Tree sparrow, chickadee, downy woodpecker, white-breasted nuthatch. Swamp edge the primary center of activity. Four-fifths of the observed activities were in the horizontal zone extending from the ground to the 20 foot level. Association showed six times the intensity which would occur by chance. Valuable for the winter population density figure of 423 to the square mile.

Economic values: Fur in Louisiana

Guillot, James P., James N. Gowanloch, and Ernest Couloheras. Statistical summary of natural resources of Louisiana, Louisiana Conservation News (Dept. of Conservation, New Orleans, La.), 5(3), July 1936, pp. 3-8, chiefly tables and graphs.

Of interest to wildlife managers are the statistics on furs; they are itemized for 6 species and for miscellaneous; the totals are:

	Number of pelts	Value
1932-3	2,504,221	$ 782,104.02
1933-4	2,370,978	1,519,775.45
1934-5	2,466,710	1,861,745.55

Education

Hicks, Lawrence E. Biological research station established at Ohio State University, Cooperative Wildlife Research Sta. (Columbus, Ohio), Release No. 1, 2 pp., mimeographed, 1936.

Announcement as to the set-up of the project, director, facilities available for cooperation, and establishment of research fellowships in wildlife conservation.

Education

Hicks, Lawrence E. Courses relating to wildlife conservation and management at Ohio State University, Cooperative Wildlife Research Sta. (Columbus, Ohio), Release No. 2, 2 pp., mimeographed, 1936.

An orientation course, a seminar, and a research course to be given by the Director. A list of courses available at the University that bear on wildlife conservation.

Education

[Leopold, Aldo]. Game management training at the University of Wisconsin (Madison, Wis.), revised Aug. 1, 1936, 6 pp., mimeographed.

Purposes of the undertaking stated. "Instruction is organized to meet the needs of three distinct classes of students: (1) Advanced training for students intending to make game management their profession; (2) Elementary courses for students who do not intend to make game management their profession, but who wish to acquire some understanding of its principles and its techniques; (3) Practical courses for farmers." Details as to all of these courses are given, as well as lists of demonstration areas, and of cooperating agencies.

Farmer-sportsman relationship

Chapman, Floyd B. Some plans for controlled shooting in use today, Ohio Division of Conservation (Columbus, Ohio), Bul. 102, 2 pp., mimeographed, July 1936.

Brief statement of plans that are, or recently have been, in effect, in 9 States.

Food Habits: American merganser

Munro, J. A., and W. A. Clemens. Food of the American merganser (Mergus merganser americanus) in British Columbia, Paper No. 3, Canadian Field-Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 50(3), March 1936, pp. 34-36.

Report on food items found, and frequency of their occurrence, in 101 stomachs from Vancouver Island and other parts of British Columbia. Sculpins and salmonids appear to be the kinds of food most frequently taken.

Food Habits: Bearing on management

Cottam, Clarence. The place of food habits research in wildlife management, The Utah Juniper (Utah Foresters, Agricultural College, Logan, Utah, no price quoted), 7, 1936, pp. 16-19, 1 photo.

Material from Wildlife Research and Management Leaflet BS-30 (noticed in Wildlife Review, 3, April 1936, p. 24) incorporated with information from other sources and suggestions as to applications in Utah.

Food Habits: Bobwhite

Hicks, Lawrence E. Winter food of the Ohio bob-white, Ohio Division of Conservation (Columbus, Ohio), Bul. 105, 2 pp., mimeographed, July 1936.

Analyses of the contents of 68 stomachs are presented so as to show both frequency and volume of the food items. Animal food composed only about one percent of the winter diet. The most important foods in order of bulk were akenes of ragweed, seeds of yellow foxtail, corn, wheat, and seeds of various legumes.

Food Habits: Bobwhite

Wilson, Kenneth A., and Ernest A. Vaughn. The Land Resettlement Administration and its wildlife program on the Eastern Shore of Maryland, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md. A reprint (in octavo), 11 pp., 4 photos, 5 tables, also can be obtained from this address.). Spring Issue 1936, pp. 21-26, 4 photos, 5 tables.

Wildlife program, mostly in the future tense, for a 10,000 acre resettlement project near Salisbury, Md. General description of the area, and scope and character of the program. A study of quail droppings yielded interesting information as to the items of food and their importance (in frequency of selection) and as to the kinds and numbers of seeds that passed through the birds entire. Waxmyrtle and partridge-pea were leading items of winter food; considering mast alone, seeds of loblolly pine made up 97 percent. The doubt cast on nutritive value of the waxmyrtle berries probably is not well founded; witness the use of these fruits by wintering myrtle warblers and tree swallows. Remarks on predator control are moderate in tone.

Food Habits: Deer browsing as affected by soil fertilization

Mitchell, H. L., and N. W. Hosley. Differential browsing by deer on plots variously fertilized, Black Rock Forest Papers (Cornwall-on-the-Hudson, N. Y.), 1(5), April 1936, pp. 24-27, 2 figs., 1 table.

Browse on nitrogen treated plots was more attractive than that on untreated areas. After careful consideration of all factors, it is concluded that intensity of browsing is more closely correlated with concentrations of reducing sugars in the foliage than with the nitrogen content or any of the physical factors studied. Bibliography of 8 titles.

Food Habits: Eastern skunk

Hamilton, W. J., Jr. Seasonal food of skunks in New York, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(3), Aug. 1936, pp. 240-6, 3 tables.

Both numbers, indicating the frequency with which food items were taken, and percentages, showing bulk of the various classes of food are given. In fall and winter specimens (1,067 in number), fruit composed 26.7 percent of the total food; other major items were mammals 19.6, carrion 13.5, grains and nuts 11.3, and grasses, leaves, and buds 10.8. Birds, including no poultry, and in only 4 instances pheasants (probably killed by hunters), composed 1.9 percent of the food. In spring and summer (570 fecal and 30 stomach analyses) insects rank highest in frequency of consumption, with fruits, mammals, and grains next. Birds attained a frequency of only 1.46. All studies of the food habits of the animal appear to be essentially in agreement that the skunk is an asset to any farm community. Bibliography of 12 titles.

Food Habits: Elk browse

Skinner, M. P. Browsing of the Olympic Peninsula elk in early winter, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(3), Aug. 1936, pp. 253-6.

Annotated list of browse in order of preference; salmonberry, huckleberries, maple, devilsclub, ferns, blackberry, fungi, alder, mosses, willows, salal, and coniferous foliage. In normal browsing an elk takes only a single bite from one plant and it may be days before another elk visits the same group of plants. Accordingly there is little or no damage to growing forage. Apparently no grass was taken.

Food Habits: Hungarian partridge

Hicks, Lawrence E. Food habits of the Hungarian partridge in Ohio, Ohio Division of Conservation (Columbus, Ohio), Bul. 104, 7 pp., mimeographed, July 1936.

About 80 stomachs from northwestern Ohio were examined. The species is highly vegetarian and takes much green herbage. The contents of 50 stomachs collected in November are tabulated according to frequency of occurrence of the items. The leading components of the diet appear to be corn, ragweed akenes, seeds of smartweeds and foxtail grasses, grass blades, and other leafage. The birds' economic status is neutral.

Food Habits: Pheasant

Hicks, Lawrence E. The food habits of the ring-necked pheasant, Ohio Division of Conservation (Columbus, Ohio), Bul. 107, 10 pp., mimeographed, July 1936.

Briefly reviews reports on food habits in 4 other States, and discusses Ohio dietary on basis of 92 stomach analyses. The pheasant is quite omnivorous and no two stomach contents have the same constituents. A list of 62 items of vegetable, and 19 of animal, food is presented. The most important vegetable foods are corn, ragweed akenes, wheat, seeds of foxtail grasses and smartweeds, and oats. Corn pulling is not so prevalent as popularly believed and may be prevented by deep planting or by the use of repellents applied to the seed before sowing. There is a bibliography of 14 titles.

Food Habits: Short-eared owl

Tomkins, Ivan R. Notes on the winter food of the short-eared owl, Wilson Bul. (Sioux City, Iowa, 60 cents a copy), 48(2), June 1936, pp. 77-79.

Sixty-eight pellets collected near Savannah, Ga., contained remains of 96 house mice, 4 rats, and 38 birds. Analysis of the last group, discussion as to where the hunting was done, and speculation as to economic values, make up the bulk of the article.

Life Histories: Bobwhite's winter territory

Errington, Paul L., and F. N. Hamerstrom, Jr. The northern bobwhite's winter territory, Iowa State College (Ames, Iowa), Research Bul. 201, pp. 302-443, 26 figs., 75 tables.

Summary of 6 seasons of intensive study of bobwhite populations in Iowa and Wisconsin agricultural communities. Extension of the territorial theory to winter range of quail coveys. The covey, although made up of varying combinations of individuals, has a rather definite territory, the significant factors of which are not always evident to the human eye. A territory"seems to be adequate if the birds like it and can live there." Techniques of counting by the use of tracks, covey flushes, rests, and roosts, and of tracing mortality are described with care. The report is based on a great deal of painstaking field work, the results of which are presented for 70 different covey territories. The observations tend to establish a surprising uniformity of winter carrying capacity for the covey ranges, to which the population is regularly reduced each year through egress or destruction. The relation of predators to carrying capacity is thoroughly discussed. "Seemingly irrespective of the kinds and numbers of predators present, the severity of simple winter predation will depend upon how many quail there are beyond the carrying capacity of the land." In the area studied "buffer" populations have little effect upon predation on the bobwhite.

Food is essential but has no demonstrated effect in directly regulating carrying capacity. Cover is necessary but its type and distribution are important, rather than details as to the particular plants that afford it. The space effect in relation to covey territories is certain but the manner of its working out is obscure. The biological applications of the vulnerability of bobwhite overpopulations point the way to more enlightened management of the bobwhite, suggestions for which are given. Field experimentation is discussed, together with the results obtained to date. There is much sound doctrine on harmony among the various groups of people interested in the bobwhite, a summary, and a list of literature cited. As full of meat as an egg, this publication will at once be recognized as the standard for its field. It will be taken as the most dependable guide yet available for management of the northern bobwhite, and it will have far-reaching effects in theoretical discussion, not only as to wildlife management but as to the problems of biological populations in general.

Life Histories: Long-tailed harvest mouse

Smith, Clarence F. Notes on the habits of the long-tailed harvest mouse, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(3), Aug. 1936, pp. 274-8, 1 fig.

Reithrodontomys megalotis longicaudus: nesting, reproduction, food habits; other observations. A combined field and laboratory study.

Life Histories: Marsh rabbit

Blair, W. Frank. The Florida marsh rabbit, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(3), Aug. 1936, pp. 197-207.

Observations on both wild and captive individuals, of which those probably of most value to the wildlife manager relate to the use of cover, need for water; enemies, parasites, and diseases; and food. Most of the food notes relate to captives; the amount eaten per day averaged 460 grams, or a little less than 30 percent of the weight of the rabbits tested. Bibliography of 8 titles, not including that by Tomkins published in the same Journal in August 1935 and abstracted in Wildlife Review No. 3, April 1936, pp. 13-14.

Life Histories: Mohave ground squirrel

Burt, Wm. H. Notes on the habits of the Mohave ground squirrel, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(3), Aug. 1936, pp. 221-4.

Citellus mohavensis: habitat, abundance, activities, burrows, foraging, sanitation, reproduction, hearing, voice.

Life Histories: Reproduction in foxes

Rowlands, I. W., and A. S. Parkes. The reproductive processes of certain mammals. VIII. Reproduction in foxes (Vulpes spp.), Proc. Zool. Soc. London (Longmans, Green & Co., Ltd., Paternoster Row, London, England, 12 shillings a copy), 1935, Pt. IV, pp. 823-841, 6 pls.

Both American and English red foxes studied. They have one breeding season a year and one period of oestrus in a season. The mating season lasts from the middle of January to the end of March, litters being born with a gestation period of 51 days, from early in March to late in May. The animals breed the year following that of their birth, thus becoming sexually mature at about ten months. The male fox which is strictly monogamous has an anoestrus apparently nearly as long as that of the female, during which time the reproductive organs are in a state of atrophic quiescence. The female, if not fertilized, manifests a period of pseudo-pregnancy which may have the same duration as actual pregnancy. There is considerable discussion of morphological changes in the female reproductive organs, and consideration of possible methods of increasing the fertility of foxes.

Life Histories: Ruffed grouse

Grange, Wallace. Some observations on the ruffed grouse in Wisconsin, Wilson Bul. (Sioux City, Iowa, 60 cents a copy), 48(2), June 1936, pp. 104-110.

Digest of field notes made in Rusk County indicates a population peak about 1922 and a low about 1927. Comment on drumming at various seasons, number of eggs, and hatching dates, and on budding and roosting habits.

Life Histories: Squirrels

Chapman, Floyd B. Fox squirrels and gray squirrels, Ohio Division of Conservation (Columbus, Ohio), Bul. 127, 4 pp., mimeographed, July 1936.

Similarities and dissimilarities in habitat and habit of the two species, based on the imperfect data available. Repetition of controlled hunting results reported in Bulletin 97, abstracted in Wildlife Review No. 4, June 1936, p. 15.

Life Histories: Willow ptarmigan

Snyder, L. L., and T. M. Shortt. A summary of data relative to a recent invasion of willow ptarmigan, Royal Ontario Museum of Zoology (Toronto, Canada), 3, 4 pp., 1 map, July 1936.

Plotting of records on a map shows that the invasion occurs as a gradual pushing out of the southern margin of the range as if a result of pressure consequent on population density. There is some evidence that fluctuations in the numbers of the ptarmigan are cyclic but the period is not definitely known.

Life Histories: Woodchuck

Chapman, Floyd B. Groundhog, Ohio Division of Conservation (Columbus, Ohio), Bul. 126, 2 pp., mimeographed, July 1936.

Popular account of the life history, food, economic value, and natural enemies of the woodchuck.

Life Histories: Woodcock

Pettingill, Olin S., Jr. The American woodcock, Philohela minor (Gmelin), Boston Soc. Nat. Hist. (Boston, Mass., $4.75 a copy), Memoirs 9(2), pp. 169-391, pls. 12-21, 7 figs., 14 tables, April 1936.

A book of monographic scope and scholarly execution. It is unnecessary to detail the contents as about everything on record relative to the woodcock, besides much new information, is included. Probably of most interest to wildlife managers are the sections on vernacular names, food and feeding habits, breeding and nesting territories, and suggestions on maintaining the numbers of the species. There is a paragraph on the creation of woodcock cover, the essentials of which are maintaining a proportion of open places and improving conditions for earthworms, including fertilizing the soil if necessary. There is an extensive bibliography.

Management: Beaver

Cliff, Edward P. The beaver - empire builder and conservationist, The Utah Juniper (Utah Foresters, Agricultural College, Logan, Utah, no price quoted), 7, 1936, pp. 23-26, 1 photo.

Value of the beaver in pioneer days; its exploitation and virtual destruction; turn of the tide bringing protection and restoration. In one National Forest in Oregon, 99 beaver were trapped and transplanted to 22 different sites at a cost of $6.56 per animal. Relation of the beaver to trout streams and to flood control.

Management: Conserving wild foods

Corsan, George H. Reforestation and afforestation, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 20 cents a copy), 40(7), July 1936, p. 153.

Notes on seed, nut, and fruit producing trees of value to wildlife.

Management: Deer

Gilchrist Don A. Introduction of new deer not a remedy, New Mexico (208 W. Gold Ave., Albuquerque, N. M., 15 cents a copy), 14(8), Aug. 1936, p. 31.

Reduction in size of deer compared to that of 20 years ago not due to inbreeding. Elliott S. Barker adds the significant note that "lack of sufficient forage and killing out of all mature bucks are more serious factors in causing deterioration in size and quality of deer."

Management: Elk

Olson, Orange O. Elk management, The Utah Juniper (Utah Foresters, Agricultural College, Logan, Utah, no price quoted), 7, 1936, pp. 10-15, 2 photos.

This is a plan and suggestions for management of elk rather than a report on an actual project. It is evidently based on experience, however, and contains many points of interest. From the increase of 178 elk introduced over a period of 10 years, 2,014 have been harvested and 3,500, it is estimated, remain.

Management: Forest wildlife

[Reports by National Foresters]. The Colorado Forester (Forestry Club, Fort Collins, Colo., 50 cents a copy), 1936, pp. 10-71, 76, 10 portraits, 5 other photos.

A series of papers by the Chief and the Regional Foresters on present problems and future prospects, some of which contain references to wildlife.

Evan W. Kelley, Region 1 (Montana). After timber-production and grazing, wildlife problems are most important. Winter range is the limiting factor for big game and more land must be allocated to this purpose. In plans for multiple use, timber growing must give way to some extent to recreation. Cutting must be prevented or restricted in or near recreational areas and along main travel routes. "Multiple-use management of forest lands is an ideal founded upon the promise that there is a social obligation to be met rather than a demand for immediate profit."

Allen S. Peck. The Rocky Mountain Region. Number of deer on various forests estimated; it can be increased about three times on the basis of 100 acres of range per individual. The great problem is that of providing winter range, which is almost altogether outside the boundaries of the National Forests.

R. M. Evans. The Eastern Region. In 1934 the Forest Service began a campaign for restoration and development of wildlife resources. The first project undertaken was a review of all timber stand improvement work to insure proper consideration of wildlife food and shelter needs. Management plans have been prepared and a 30,000 acre game refuge created within the George Washington National Forest.

Chas. H. Forward. Alaska. "The immense areas in the National Forests of Alaska, practically free from the administrative inconvenience of alienated

lands and with no grazing of domesticated animals, constitute an ideal unit for the full development and control of the wild life resources. x x x We feel that our game management problem has an importance which is difficult to appreciate from a distance. It is not local. It is not restoration. It is one of perpetuation, maximum use and enjoyment of these last stands of North American big game over a vast unhampered region, where Nature has precluded any choice but that wild life shall be the primary crop and major resource."

Management: Forests for wildlife

Morton, James N. Wildlife: an important forest product, Journ. of Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(1), Jan. 1936, pp. 40-45.

Pennsylvania system of game refuges and public hunting grounds is the most essential contribution of the commonwealth to the recreational needs of its citizens. Efforts of the State to maintain the game crop, in addition to which environmental management must be seriously undertaken. Foresters fail "in their duty to the people and to the profession when they do not consider game an integral part of the forest and give proper recognition to it in the plans of management." Necessity of regulating forest growth so as to preserve conditions favorable to wildlife. "Game is going to suffer irretrievable losses if the planting of all openings and old abandoned fields is permitted." "Participation in the development of the forest for the greatest good to all is not only a forester's privilege, it is his duty."

Management: Forests for wildlife

Wing, Leonard W. Naturalize the forest for wildlife, American Forests (919 - 17th St., N.W., Washington, D. C., 35 cents a copy), 42(6), June 1936, pp. 260-1, 293, 5 photos.

Planting of solid stands of conifers on bare areas, and clearing weed trees, snags, & fallen logs out of woodland are present day forestry practices inimical to wildlife. If plantations must be made, break them up. "The only satisfactory use of pines for game is for winter cover. Plantations in proper places can definitely increase the carrying capacity of the land. Making plantations in small units may increase the game value of an area; covering solidly will ruin it. There are four simple rules to bear in mind: (1) Blocks (plantations) must be within the cruising radius of the animal. (2) Blocks should be of small size, best if not over 200 yards across. (3) Food-bearing trees and shrubs should be planted between blocks. (4) Plantations should be used only where natural winter cover is not available.

"Rule number five is as applicable to standing timber as to reforestation. It is: (5) Leave dead trees for the hole-nesters, leave logs for the grouse, leave browse for the deer, leave food for the animals - in short, naturalize the forest!" (p. 293)

Management: Marsh restoration

Kay, Lee. Utah's program in building waterfowl marshes, The Utah Juniper (Utah Foresters, Agricultural College, Logan, Utah, no price quoted), 7, 1936, pp. 20-22, 1 photo.

Use of water in a land dependent on irrigation resulted in a rapid decrease in ducks "through disease or other conditions brought about through the decimation of marsh lands." Now restoration is the watchword and several important projects have either been completed or are under way. These are described. Some are inviolate sanctuaries, while on others hunting is than restricted to certain areas, or permitted only on a smaller number of days/is allowed by the general open season.

Management: Moving moose

East, Ben. A moose herd is moved, New York Zoological Society Bul. (New York, N. Y., 30 cents a copy), 39(4), July-August 1936, pp. 141-9, 10 photos.

Illustrated account of the trapping, crating, and shipping of 38 moose from Isle Royale to the mainland of Michigan.

Management: Multiple use

Chapman, Floyd B. The solution of land utilization problems by production of forest wildlife, Ohio Division of Conservation (Columbus, Ohio), Bul. 101, 2 pp., mimeographed, July 1936.

Habitat most favorable to wildlife is the interspersion zone; even deer or grouse would starve in an unbroken forest; stand improvement may be inimical to wildlife; multiple use to be urged upon all classes of woodland owners in Ohio.

Management: Multiple use

Morton, James N. [Chairman]. Correlating forest practices, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 7(3), June 1936, pp. 2-5, 20, 6 photos.

An excellent report, recognizing all interests, and commenting on all phases of the subject. Recreational uses of forests, duty of the forester to encourage them, analysis of wildlife management, forests and forest management in relation to wildlife, research is needed but as good a job as possible should be done with present knowledge, fire control policies as bearing on wildlife, recreational facilities, stream improvement, game enumeration, skilled services required.

Management: National Parks

Wright, George M. Wildlife of National Parks, American Planning and Civic Annual (American Planning and Civic Association, Union Trust Bldg., Washington, D. C., $3.00 a volume), 1935, pp. 28-31.

Value of sanctuaries, especially the National Parks, in wildlife conservation. Notes on species of particular interest and of the general conservation policy of the National Park Service.

Management: Planning for wildlife

Barker, Elliott. Planning for wildlife, Wyoming Wild Life (State Game and Fish Dept., Cheyenne, Wyo. Free), 1(4), June 1936, pp. 7-11, unnumbered.

Exploitation of wildlife by pioneers; usurpation of its range for ranches and for other purposes; definite planning now needed. "I contend that our wildlife resources are as important from an economic, esthetic, health, and recreational standpoint in a well balanced development set-up as roads, agriculture, stock raising, timber and watersheds, and deserve effective consideration along with other projects. They can no longer be ignored or subordinated, especially where land is better suited to wildlife than to other purposes. x x x A good example of planning for wildlife was worked out here in New Mexico in cooperation with the stockmen, sportsmen and other agencies in connection with the Taylor Grazing Act. We procured the promulgation of a rule satisfactory to all, that reads as follows: 'Carrying Capacity to Provide for Game. In estimating carrying capacities of public domain ranges and in allotment of numbers of domestic stock to be grazed within any grazing district, allowance shall be made for reasonable utilization by wildlife'."

Management: Planting for wildlife

Fox, Adrian C. Planting guide of trees, shrubs, vines, and evergreens recommended for game bird cover and food in South Dakota and North Dakota, Soil Conservation Service (Huron, S. Dak.), 17 pp. (8 x 14), 6 figs., August 1935. Mimeographed.

Description of cover types and mention of some of the plants that compose them. A long table gives the common name, scientific name, status as to whether native or introduced, information as to whether seeds, cuttings, etc. are locally available, notes on native habitat, and miscellaneous remarks for recommended species of the categories cited in the title. Supplemental lists give other suggestions and there are paragraphs on methods of propagation, collecting planting material, cultivation, and fencing.

Management: Planting for wildlife

Hershey, John W. Forest fruits, The Southern Planter (223 Governor St., Richmond, Va., 5 cents a copy?), 97(7), July 1936, p. 9, 1 photo.

Utility of honey locust pods as browse; of mulberries in attracting birds valuable in controlling insects; and of other tree crops. Development of these crops by the Tennessee Valley Authority.

Management: Planting for wildlife

Hershey, John W. Paradise or Hades, The State Farmer (Asheville, N. C.), July 1936, p. 5, 3 photos.

Information similar to that in the preceding reference plus suggestions as to the value of blueberries, serviceberries, cherries, plums, hawthorns, etc., to wildlife.

Management: Planting, seed collecting

Wakely, Philip C. Collecting, extracting, and marketing southern pine seed, Southern Forest Experiment Station Occasional Papers (New Orleans, La.), 10 pp., 2 figs., 3 tables, multilithed, Oct. 1936.

Scouting for cones, range in numbers of cones per bushel, dates of maturity, collecting and shipping cones; extracting, cleaning, testing, and storing seed.

Management: Planting, seed scarification

Chapman, A. G. Scarification of black locust seed to increase germination, Journ. of Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(1), Jan. 1936, pp. 66-74, 4 figs., 2 tables.

Impermeability of seed coats, treatments employed to lessen it; scarification most practicable; description and diagram of a scarifier; its use and results, germination being increased by as much as ten times by a single treatment. Bibliography of 14 titles.

Management: Planting, seed treatment

Mcginnis, H. G. Sulphuric acid treatment for black locust seed, Southern Forest Experiment Station Occasional Papers (New Orleans, La.), 47, 4 pp., multilithed, June 1935.

An effective and practicable means of increasing germination and seedling yield fully described.

Management: Range

Various authors. The western range, Senate Document, 74th Congress, 2nd Session, 199 (Supt. of Documents, Washington, D. C., 60 cents a copy), xvi+620 pp., 87 figs., 89 tables, July 1936.

This document, prepared by the Forest Service with the cooperation of several Federal and other organizations, states that the range has been so misused that "It will probably require more than 50 years of management to restore the depleted range sufficiently to carry even the 17.3 million live-

stock units now grazed, and probably another 50 years to restore it to the nearest possible approach to its original grazing capacity of 22.5 million units." (p. viii.)

The report contains several more or less lengthy references to wildlife as here noted:

The lag in research and extension, by M. W. Talbot and E. C. Crafts, pp. 185-192, table 129.

A section entitled "Interplay of animal factors in their effect on range," p. 191, is a plea for additional research to provide the necessary basis for wildlife management.

[The range] As a home for wildlife, by L. J. Palmer and S. B. Show, pp. 341-361, figs. 75-77, tables 60-63.

Statement of original abundance of game on the range. Due to slaughter, occupation of the range by ranches, and competition by grazing stock, "most of our big game animals today are found in the mountainous areas to which they are not especially well adapted, at least for year-long grazing." "The forage stand on the principal forage types used by game during the critical seasons has been depleted over 50 percent in comparison with its virgin condition." Present status of the various species, economic considerations involved, and defects in theories adopted in wildlife conservation. That the legal "approach to the problem of wildlife management is biologically unsound has become increasingly evident, as populations of wildlife - particularly of game birds, animals, and fish - have continued to decrease, despite more and more laws and more and more officers to enforce them." The underlying difficulty is the failure to consider wildlife as a crop and to apply wildlife management. Failure of refuges without due attention to management; wholesale transplanting objectionable; wildlife management a biological problem. Tabulation of present and proposed refuges and reserves for wildlife in the western range area; estimates of wildlife on National Forests as of December 31, 1934; and increase or decrease of big game on National Forests, 1925-1934.

Some of the conclusions of this section are:

"1. Wildlife is a product of environment and each species can succeed only under a specific environmental pattern, made up of determinable and (except for climate and elevation) controllable elements.

"2. Management of wildlife starts with and is limited by management and manipulation of environment.

"3. Lacking established legal power to force conservative management of land and environment, attempts to manage wildlife solely under restrictive game laws can succeed only to the degree that environment is independently maintained and improved. The key to wildlife management rests with land ownership.

"4. The legal theory which places title to wildlife in the State, leaves little direct incentive to private or other public owners to manage land in a way to favor wildlife.

"5. Game species must be handled on a crop basis, with the annual take adjustable to and definitely set on the basis of annual increase. The problem differs not at all in this respect from that of maintaining continuously productive flocks and herds of domestic birds and animals.

"6. In addition, successful wildlife management is a problem in applied biology, and requires, first of all, a factual basis, and secondly, professionally trained men to apply the facts. For game species, such questions as sex ratio, best season for taking, desirable degree of predatory control, and needed environmental changes, must be handled on a flexible basis, adapting action to needs of particular areas at particular times.

"7. Given a suitable environment, and management on a crop basis, most wildlife species can succeed on lands used by other wildlife species, and by man and his domestic animals. If handled as a part of conservative multiple-purpose land management, wildlife populations can be maintained or increased. Deliberate attention to such things as reservation of feed for wildlife on summer and winter range, are simply a part of good land management." (pp. 360-361.)

The probable future use and ownership of range lands, by S. B. Show, pp. 421-450, tables 68-72.

A section, "To protect wildlife," pp. 444-5, states the desirability of excluding livestock from areas where there is heavy camping and other recreational use, and from those needed for winter range for wildlife. "Removal of such lands from domestic livestock use in particular localities has been and is inevitable, as competing and inescapable public demands of growing population and growing outdoor recreation develop. For example, 4,240,000 acres of usable range on the national forests have been closed for exclusive use for wildlife and recreation." (p. 444.) A table is presented of estimated acreage needed for wildlife in 15 States, the total being over 20,000,000.

The management of range lands, by L. F. Watts, George Stewart, Charles Connaughton, L. J. Palmer, and M. W. Talbot, pp. 501-522, fig. 85, tables 80-85.

"A program for wildlife," pp. 518-9, suggests additional recognition of recreational and other values of mammals, birds, and fishes, and the reservation of areas for their use.

"'Single use' for game will be necessary on only a limited area. Even on game refuges and bird sanctuaries, watershed protection will be furnished and recreation may be allowed with some restriction. Use by domestic livestock should not, however, be allowed on some limited areas of especial importance to wildlife, such as: (1) Nesting and feeding refuges for migratory waterfowl located at key points along the paths of flight, (2) winter range for big game where there is a critical shortage of feed for this season, (3) special areas to preserve species in danger of extinction." (p. 518.)

Research and extension program, by W. R. Chapline and R. S. Campbell, pp. 523-533.

"Wildlife," pp. 529-30. Again insistence upon an adequate program of research as a basis for management. It should be broadly ecological and be planned with reference to all uses of the range.

Legislation and costs, by S. B. Show and E. I. Kotok, pp. 535-555, tables 86-88.

"The problem of managing wildlife on federal lands," p. 544. "Where the pattern of management in a State proves inadequate to meet the opportunity for constructive wildlife management on Federal properties, means of action, applied directly by the Federal Government, should be developed."

Southern forest ranges, by W. G. Wahlenberg and E. W. Genmer, pp. 567-580, fig. 86, table 89.

"Wildlife on southern ranges," pp. 572-3, contains a brief historical account of wildlife in the region, data on the kill of 1929-30 in Alabama, and in 1932-3 in Texas, and suggestions as to the harmonizing of grazing and wildlife interests, and use of controlled burning. The recommendations of management measures follow rather closely those worked out during the Cooperative Quail Investigation.

Alaska, by B. F. Heintzleman, pp. 581-598, fig. 87.

"Reindeer grazing," pp. 588-9. "The reindeer is closely related to the wild caribou and intermingling of the two classes of animals produces losses to the herd owner in the straying away of reindeer with the caribou. Intermingling is also undesirable because the caribou as a game animal should be kept pure in strain. The coming of the reindeer industry thus requires the sacrifice of the caribou on the same range and this necessitates the elimination of caribou from the coastal areas of the Bering Sea and Arctic Ocean." (p. 588.) It would seem from this that reindeer production in Alaska should be restricted to local needs and abandoned as an exporting business.

"Wildlife," pp. 589-591, is largely a catalogue of game animals of the Territory, with some statements as to value, and need of protection.

"Predatory animals," p. 592, calls attention to the spread of the coyote and the need of control.

Management: Refuges

Darling, Jay N. Wildlife areas and National land planning, American Planning and Civic Annual, 1935 (American Planning and Civic Association, Union Trust Bldg., Washington, D. C., $3.00 a volume), pp. 37-40.

Erosion control measures are wildlife conservation measures also. In controlling erosion, land planning is necessary and it should take into account the needs of wildlife. The sanctuary program of the Biological Survey is giving back to wildlife areas that should never have been taken for other uses.

Management: Refuges

Gigstead, Gil. Refuges as a management practice, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 20 cents a copy), 40(7), July 1936, pp. 148-9, 161.

The Wisconsin program; about 200,000 acres are now in refuges. Horicon Marsh now seems assured to the wildfowl; it is estimated that 15,000 ducks were produced there in 1934. Notes on feed patches; plantings of milo maize, buckwheat, and hemp preferred.

Management: Stocking

Hicks, Lawrence E. History of the importation and naturalization of the ring-necked pheasant in the United States, Ohio Division of Conservation (Columbus, Ohio), Bul. 106, 3 pp., mimeographed, July 1936.

Notes on the subspecies of ringnecks introduced; compilation of data as to distribution and degree of success in establishing pheasants in various States, given in most detail for Ohio and including in that case, a tabulation of the number of birds and eggs distributed each year from 1919 to 1935.

Management: Upland game birds

Scott, Thomas G., and George O. Hendrickson. Upland game birds in Iowa, Iowa Agricultural Experiment Station (Ames) Extension Circ. 228, 32 pp., illus., June 1936.

Attractively gotten up, with firm cover, coated paper, drawing of each bird treated, and various decorative designs, this booklet gives a popular account of each native and introduced upland game bird of Iowa. General suggestions for the management of the ring-necked pheasant, European partridge, bobwhite, and ruffed grouse are given in the text and epitomized in a summary. A section on winter feeding of upland game birds also is included.

Propagation

Mitchell, Horace. Raising game birds (The Penn Publishing Co., Philadelphia, Pa., $5.00 a copy), xiii+315 pp., 8 col. pls. and other illus., 1936.

Contains a chapter of general suggestions, and two each on rearing mallards, ring-necked pheasants, bantams, and ornamental fowl. One chapter is devoted to each of these four additional subjects: quail, wild geese, vermin, and business management. Although the book is based on experience and contains many suggestions that could originate only with an observant breeder, it does not describe what are considered the most improved methods such as rearing on wire, poss ibly because of location in Maine the author

did not have as many losses from disease as do breeders in more southern areas. The volume evidently is an "assembled" one as it contains some of the same errors that were in his earlier work on Game Farming and sections written for some boy's magazine containing suggestions as to, 'asking your father to help you'. The author says "I certainly do not advocate complete annihilation of any of the various species of vermin mentioned. It would be too bad to have them wiped from the earth. But in most localities more effective methods ought to be employed against these natural destroyers." The reviewer would comment that any more effective methods than have been employed certainly will wipe from the earth some species of so-called vermin, for example, some of the hawks.

Propagation: For shooting

Bedell, C. S. Duck shooting - homemade, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 20 cents a copy), 40(7), July 1936, pp. 146, 162-3, 3 photos.

Description of the methods developed by the Flanders Club on Long Island, N. Y., including penning, care, and feeding of adults and of young, vermin control, and shooting system.

Propagation: Guinea fowl

Bentley, B. Howard. Is the guinea fowl a game bird?, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 6(8), Aug. 1936, pp. 4-5, cover cut.

The author does not answer the question but submits the data available to him for what it is worth. Propagation methods rather fully discussed. So far as the abstracter is informed, the statement of John C. Phillips in 1928 (Tech. Bul. 61, U. S. Dept. Agr., p. 11) still holds good, namely, that in the United States guinea fowl "have shown absolutely no indication of reverting to the wild."

The article cited is followed by one entitled "Guinea Fowl's Place on Farm," by W. H. Harrison (pp. 6, 12, 1 photo), and by another, "The 'guinea'," by Gerald F. Wright (p. 7), all of which together contain a great deal of what is known of these birds in the domesticated state.

NOTES AND NEWS

At the suggestion of the Biological Survey, the Secretary of Agriculture has appointed a Committee to consider planting recommendations made by various bureaus of the Department, especially in relation to noxious qualities of the plants, existing quarantine regulations, campaigns for plant pest control, etc. The Bureaus represented on the Committee are those of Animal Industry, Biological Survey, Entomology and Plant Quarantine, and Plant Industry, the Forest Service and the Soil Conservation Service.

The Soil Conservation Service (Washington, D. C.) issues a mimeographed leaflet, abstracting current Soil Conservation literature that includes references to papers on wildlife management.

The Resettlement Administration has kindly supplied the following information supplemental to the account of its work that appeared in WILDLIFE REVIEW, No. 4, June, 1936, pp. 26-27.

States in which land is being purchased for migratory waterfowl refuges and number of projects in each: Arkansas, 1; Florida, 1; Georgia, 1; Louisiana, 3; Michigan, 1; Minnesota, 2; Montana, 3; Nebraska, 3; North Carolina, 1; North Dakota, 5; Oregon, 1; South Carolina, 2; South Dakota, 4; Tennessee, 1; Texas, 1. In addition to the projects which are being developed in cooperation with the Biological Survey, there are four projects, which have as their aim the conservation of wildlife, that are being undertaken by the Land Utilization Division of the Resettlement Administration. They are listed below:

State	Project	County	No. of Men Working
Wisconsin	Central Wisconsin: Necedah	Juneau, Wood Jackson, Monroe	652
Wisconsin	Central Wisconsin: Black River	Clark, Jackson	597
Missouri	University of Missouri:	Boone	96
Florida	Welaka	Putnam	465

The Veterans Administration is making plans for the conservation of wildlife on all of the reservations under its charge, some 80 in number. These are mostly former military sites on which hospitals are now maintained. All are of considerable, and some of large, acreage.

The Florida State Legislature has passed a law providing that all higher State Educational Institutions shall give instruction in nature study and in the conservation of natural resources, and further that all students in such institutions, preparing to be teachers, shall be required to take such courses of instruction. The law also stipulates that all high schools supported by public funds shall give instruction in the conservation of natural resources and that all students shall take the course.

The Iowa Conservation Commission reports that over 290,000 shrubs and trees of value to wildlife were planted during the spring of 1936. These were used on 18 state-owned dry lake beds on 8 of which crops for wildlife food also were planted.

Pennsylvania now has a law authorizing control by the Board of Game Commissioners of roadside menageries. It applies to any place where one or more animals may be kept for the purpose of exhibition or attracting trade. It requires that each menagerie have an annual permit and that no permit shall be granted until the Board is satisfied that provisions for housing and caring for the animals and for protecting the public are proper and adequate. The regulations under the Act call for roomy, comfortable enclosures and housing, ample protection for spectators, regular and wholesome feeding, constant provision of fresh water, efficient sanitation, and humane treatment.

The Wisconsin Conservation Bulletin (1(5), May 1936, p. 3) contains the following interesting note: "Overtrapping of predators has brought a mouse plague to some sections of Wisconsin and during the past winter the little rodents have destroyed forest and shade trees as well as orchards. x x x 'Weasels, foxes and coyotes should be here to control the mice,' Conservation Director H. W. MacKenzie points out. 'A predator may also take a rabbit but predators are necessary to hold down the mouse population in the forest areas.' x x x The only practical way to meet the growing rodent menace is to permit an increase in the number of their natural enemies such as owls, weasels, coyotes and foxes, Director MacKenzie says."

The University of Wisconsin (Madison) issues a Game Research News Letter (mimeographed) of which No. 9 is dated August 10, 1936. The leaflet is for the information of students, research workers, and cooperators of the Chair of Game Management occupied by Professor Aldo Leopold. Bibliographies and suggestions for needed researches in wildlife management are features.

Additional facts of interest about MacDonald's book on "Big Game Management" (abstracted in WILDLIFE REVIEW, No. 4, June 1936, pp. 10-13) have been furnished by J. E. Stillwell of Dallas, Texas. The book was financed by a friend of the author and by a printing establishment in Dallas. Folios were printed for about 500 copies and one source of information indicates that a total of 200 copies were bound, of which 150 were turned over to the author. The remaining folios were destroyed. The work, therefore, will have a place in the rare book list, and the whereabouts of the author being unknown, there is no known source from which the book can now be obtained.

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WILDLIFE REVIEW

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UNITED STATES DEPARTMENT OF AGRICULTURE

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Washington, D. C. No. 4 June, 1936

Conservation

Anon. The hawks and owls are the farmers and sportsmens best friends, Poster (Federal Cartridge Co., Minneapolis, Minn.).

A two-scene poster urging protection of hawks and owls. A welcome innovation.

Conservation

Various authors. Hearings before the Select Committee on Conservation of Wildlife Resources, House of Representatives, Seventy-fourth Congress, First Session (obtainable from Hon. A. Willis Robertson, Chairman, House Office Bldg., Washington, D. C.), 121 pp., 1935.

Contains discussion of recent work and problems by representatives of chiefly Federal agencies concerned with wildlife, and prepared statements on various phases of their operations. Represented are the Biological Survey, Soil Conservation Service, Forest Service of the Department of Agriculture; the National Park Service and Reclamation Service of the Department of the Interior; the Bureau of Fisheries of the Department of Commerce; the Committee on Rivers and Harbors of the House of Representatives; the National Resources Committee; and the Izaak Walton League of America.

Conservation: In Germany

Leopold, Aldo. Naturschutz in Germany, Bird-Lore (1775 Broadway, New York, N. Y., 30 cents a copy), 38(2), March-April 1936, pp. 102-111, 6 photos, 1 table.

Comparison of results of treatment of some of the larger forms of wildlife in Germany and in the United States, the records about balancing. Human characteristics bearing on conservation are about the same in the two countries, but in Germany nature protection is one of the explicit tenets of the present ruling party. Predators having been longer exposed to intensive control are scarcer than in the United States. A tabulation is given of the numbers killed in relation to the head of game taken in several localities. A definite predator restoration policy has been begun. It is the implied assumption that only game has value that discredits the game movement in any country. To get more game at the expense of the wild environment and the wild predatory species is to get very little indeed. Bad effect of exclusive conifer planting in Germany on forest wildlife and present efforts to remedy the situation.

Conservation: Needs in the Southwest

Brown, C. B. Intelligent game conservation, Hoofs and Horns (121 E. 10th St., Tucson, Ariz., 10 cents a copy), 5(8), Jan. 1936, pp. 5, 7.

Wildlife as a basis of recreational expenditures. Growth of refuge acreage in Arizona (now 435,573) and in New Mexico (331,755). Need of research and of cooperation by landowners.

Conservation: Soil Conservation Service viewpoint

Bennett, H. H. Wild life and erosion control, Bird-Lore (1775 Broadway, New York, N. Y., 30 cents a copy), 38(2), March-April 1936, pp. 115-121, 4 photos.

Seriousness of farm erosion. Land going out of agriculture not necessarily favorable for wildlife. Aim and methods of the Soil Conservation Service. "We propose a plan of land conservation to replace the old system of exploitation". Every manipulation of the soil directly or indirectly affects wild life. "The objectives of our wild-life program may be stated briefly: (1) The avoidance, insofar as possible, of acts which would be detrimental to wild life; (2) the betterment of conditions for wild life as a whole; and (3) the development of an annual self-perpetuating crop of game, fur-bearers, and game fish to provide supplemental compensation to the farmer for lands retired from agricultural use in the interest of erosion control." Progress of the work in various States. Need for cooperation in conservation.

Control: Crow

Curtis, Paul A. Crow management, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 20 cents a copy), 40(4), April 1936, pp. 77-78, 95, 2 halftones.

The crow as game to be taken at "any time of year in any quantities limited only by our persistence and ability." "I am not interested in methods of poisoning them, trapping them, or dynamiting them x x x I am not a believer in their elimination." Experiences and suggestions as to calls, blinds, and conditions favorable to shooting. A photograph, probably not furnished by the author, is labeled "Jim Crow at his nefarious work." It shows crows feeding on eggs washed up by the tide.

Control: "Vermin"

McAtee, W. L. What is vermin?, Outdoor Life (353 Fourth Ave., New York, N. Y., 15 cents a copy), 77(6), June 1936 (May), pp. 40-41, 52.

One man's vermin is another man's game or fur. Control should be exercised only when necessary and then only by legal and humane methods.

Non-sportsmen have a valid interest in wildlife which should be respected by sportsmen. Improvement of environment a more effective method than vermin control for increasing game. The captions of some illustrations not seen by the ostensible author are opposed in tenor to the article which is largely ghost-writing by Arthur Grahame based on interviews and publications by McAtee.

Cycles

Elton, Charles, and G. Swynnerton. The Canadian snowshoe rabbit inquiry, 1934-35, Canadian Field-Naturalist (532 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 50(5), May 1936, pp. 71-81, 4 figs., 4 tables.

Fourth annual report on the fluctuations of the snowshoe hare; the results of the investigation to date show a well-marked cycle of about 10 years in the rabbit population, shared also by those of the red fox and lynx.

Disease: Lead poisoning, etc.

Green, R. G., and J. E. Shillinger. Minnesota Wildlife Disease Investigation (obtainable from Dr. J. E. Shillinger, Biological Survey, Washington, D. C.), Jan. 1936, pp. 100-112, tables 87-90, mimeographed.

Contains a discussion of lead poisoning in waterfowl; a Special Report on the Production of Lead Alloys for the Prevention of Lead-poisoning in ducks, by Robert G. Green and Ralph L. Dowdell (based on rapid disintegration of a lead-magnesium alloy in the gizzard of ducks); a discussion of a type of paralysis occurring in penned foxes fed on uncooked fish; notes on trapping results and ectoparasites of snowshoe hares; immunity studies of rabbits in relation to tularemia; and autopsies of 12 snowshoe hares and 1 ruffed grouse.

Disease: Lead poisoning, etc.

Green, R. G., and J. E. Shillinger. Minnesota Wildlife Disease Investigation (obtainable from Dr. J. E. Shillinger, Biological Survey, Washington, D. C.), Feb. 1936, pp. 113-125, mimeographed.

Report by Green and Ralph L. Dowdell on "Disintegration of Lead-magnesium Alloy in the gizzards of ducks". Finding: "The minimum magnesium content for a disintegrable lead alloy lies between 1.5 and 2.0 percent magnesium." Counts of snowshoe hares in St. Louis County, Minnesota, indicated a marked decrease in the population from Nov. 1, 1935, to Jan. 9, 1936. Results are presented of autopsies on 22 specimens from that area, also on 14 hares and rabbits from the Lake Alexander area, and 10 miscellaneous mammals and birds. In discussing a parasite of ticks, the fact is noted that the parasite infests only immature ticks.

Disease: Parasites (external) of birds

Peters, Harold S. A list of external parasites from birds of the eastern part of the United States, Bird Banding (95 South St., Boston, Mass., 50 cents a copy), 7(1), Jan. 1936, pp. 9-27.

198 species of lice, flies, ticks, and mites recorded from 255 species and subspecies of birds. A list of the parasites is given for each bird; they number 15 for the bobwhite for instance. Known distribution by States is indicated.

Disease: Of owls

Green, R. G., and J. E. Shillinger. A virus disease of owls, Amer. Journ. Pathology (818 Harrison Ave., Boston, Mass.), 12(3), May 1936, pp. 405-410, Pl. 47.

"A virus disease has been recognized as a natural disease in the great horned owl x x x The infection has been transmitted experimentally to the same species and to the screech owl x x x but not to the barred owl. The disease is characterized by the formation of multiple abscesses in the liver, and less consistently, in the spleen" (p. 410).

Ecology: Forest type in relation to deer

Leopold, Aldo. Deer and Dauerwald in Germany. I. History, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(4), April 1936, pp. 366-375, figs. 1-5 (graphs).

German forests are overstocked with deer. "The situation flatly contradicts the uncritical assumption, dying but not yet dead in America, that the practice of forestry in and of itself, regardless of what kind or how much, promotes the welfare of wildlife." Sketch of the rise and fall of game populations in relation to historical events and forest practices. After a period (1810-1914) of spruce mania, good for neither forestry or game production, there finally came definite national recognition of the superiority of mixed forest, beginning in 1918.

Ecology: Population control

McAtee, W. L. The Malthusian principle in Nature, Sci. Monthly (Lancaster, Pa., 50 cents a copy), May 1936, pp. 444-456.

The Malthusian principles, "population is necessarily limited by the means of subsistence", and "population always increases where the means of subsistence increase", do not normally function in nature. Discussion of space restriction on populations, illustrated in part by game bird numbers; self-limiting tendencies in organic populations; and theoretical considerations.

Ecology: Population studies

Smith, Harry S. The role of biotic factors in the determination of population densities, Journ. Economic Entomology (450 Ahnaip St., Menasha, Wis., 75 cents a copy), 28(6), Dec. 1935, pp. 873-898, figs. 126-130 (graphs), 1 table.

Based on entomological experience, yet of general application to population studies. The main point made is that of factors regulating populations, the most important are those dependent on, rather than those independent of, density. Bibliography of 16 titles.

Ecology: Swamp values

Agersborg, H. P. K. The nature of swamps. When, if ever, should they be drowned or drained?, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 24(6), Nov.-Dec. 1935, p. 88.

Swamps often have a highly characteristic flora and fauna, to the continued existence of which their conservation is necessary. Suggestions for eliminating mosquito breeding without destroying the swamps; lead arsenate sprays should not be used. The swamp has a unique economic value and a definite place in the scheme of balanced nature, especially in promoting diversification of habitat.

Ecology: Rainfall in relation to bobwhite crop

Gerstell, Richard C. Precipitation in relation to game crops, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 25(2), March-April 1936, pp. 22, 26-28, 1 graph, 1 photo.

Contrary to popular belief, eleven years' records of the quail kill in Pennsylvania show that when the breeding season precipitation was above the mean the quail kill was above the mean and vice versa. Suggested reason is variation in proportion to rainfall of the food supply for young quail.

Ecology: Range management

Darling, J. N. The jokers in western grazing, Successful Farming (Meredith Publishing Co., 1714 Locust St., Des Moines, Iowa, 5 cents a copy), April 1936, pp. 9, 22, 47-49, 4 photos.

Vivisection of the Taylor Grazing Act. "In a day when the farmers of fertile, well-watered areas are asked to cut down production of wheat, corn, cotton, tobacco, and other crops, it just doesn't make sense for Uncle Sam to give free or extremely cheap grazing privileges in the arid or semi-arid regions." "It would seem perfectly evident that the Department of Agriculture should control all policies related to land use." Exploitation of the

range is "making it almost impossible for wild life to exist. x x x [various forms] are on the way to extinction because of the disappearance of feed, water, and cover. It would be far better for everybody concerned, in the long run, to dedicate the public domain to wildlife."

Food Habits: Fur-seal

Anon. Food of fur seals, U. S. Fisheries Service Bul. (U. S. Dept. Commerce, Washington, D. C.) 252, May 1936, p. 6.

Thirty-nine stomachs examined by the Biological Survey contained no salmon and of 593 reported on by Canadian authorities, only 7 percent held salmon. The principal food is herring but squids and crustaceans also are taken. The fur seal is not a menace to salmon and halibut fisheries.

Food Habits: Mallard

Munro, J. M. Food of the common mallard in the lower Fraser Valley, British Columbia, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 38(3), May-June 1936, pp. 109-111.

Report on 90 stomach contents, of which 21 contained 90 to 100 percent fragments of grass leaves, and 27, 90 to 100 percent wild oats. Food items most frequently identified were wild oat, smartweed, bur-reed, and pondweed.

Food Habits: Mink

Hamilton, W. J., Jr. Food habits of the mink in New York, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(2), May 1936, p. 169.

Report on analyses of food contents of 70 viscera; frequency indices of leading items of food are: Mice 32.94, fish 18.82, crayfish 16.47, and muskrat 14.12. The results agree well with those of Dearborn for Michigan (Bul. 1, School of Forestry and Conservation, Ann Arbor, Mich., 1932).

Food Habits: Mule deer

Robinson, Cyril S. A study of plants eaten by deer on the Santa Barbara National Forest (U. S. Forest Service, Santa Barbara, Calif.), 1935, 8 pp., mimeographed.

California mule deer. "It is the opinion of the author that deer are primarily browsing animals, and that the best yearlong deer range should be composed of approximately 60 percent browse or shrubs, 25-30 percent weeds and herbs, and 10-15 percent grasses and grasslike plants." Palatability ratings and notes on utilization are given for long lists of plants in all of these categories. Brief mention is made of the use also of mistletoe, mosses, and fungi. Plants with the highest palatability ratings in the principal groups are: Browse, blue elderberry (Sambucus glauca) 80, and bitterbrush (Purshia glandulosa) and redberry (Rhamnus crocea) each 70; weeds and herbs,

filaree (Erodium cicutarium) and bur-clover (Medicago hispida) each 90; alfalfa (Medicago sativa) and clover (Trifolium spp.) each 80; grasses and grasslike plants, bluegrass (Poa pratensis), sedge (Carex spp.), and rush (Juncus spp.) each 50. A valuable contribution.

Food Habits: Pheasant

Dalke, Paul D. Economic status of the pheasant and the relation of farming practices in southern Michigan thereto, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 24(6), Nov.-Dec., 1935, pp. 86, 94, 2 photos.

Results of analysis of 353 crops summarized; differences in feeding habits of the young and adults discussed; estimate in pounds of various kinds of food consumed by 100 pheasants on the average section of land in the general farming region of Michigan. Grain, the chief reliance of the bird, is mostly waste. Grain stubble fields are the most important source of winter food. The total proportion of insect food is not great but the pheasant's capacity for destroying insects is great. The burning of fencerows eliminates valuable late winter foods and the burning of marshes in spring destroys nests.

Food Habits: Snowshoe hare

Aldous, C. M. Food habits of Lepus americanus phaeonotus, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(2), May 1936, pp. 175-176.

Report on 54 Minnesota stomachs studied by the Biological Survey. One contained traces of insects, but the food of the whole number was practically 100 percent vegetable. Stomachs collected in winter and spring contained chiefly woody plants as aspen, willow, and birch; those taken in summer were mainly strawberry and Antennaria; and those in fall largely grasses. Other details are given.

Food Habits: Snowshoe hare damage and its control

Anon. Rabbits cause great losses to plantations in brushy areas, Lake States Forest Experiment Station (St. Paul, Minn.) Technical Notes, No. 116, May 1936, 1 p., mimeographed.

Snowshoe hares caused loss of 16 percent of seedling jack pines on areas where brush cover was cut, and of 56 percent where it was not; corresponding figures for Norway pine are 22 and 34 percent, respectively. "It is thus evident that plantations cannot successfully be made in brushy areas in times of high rabbit population, unless some provision is made to protect them from these animals. One method of protection is to change the cover conditions."

Life Histories: Bobwhite population fluctuations

Kennedy, I. N. Fluctuations in bobwhite quail populations in the South, Outdoor Florida (1306 Grand Central Ave., Tampa, Fla., 10 cents a copy), 1(2), March 1936, pp. 10-11, 17, 3 photos.

A compilation of views expressed in letters and in print by a number of persons including Herbert L. Stoddard and Charles O. Handley. The fluctuations are not known to be periodic but are due largely to meteorological extremes. Long time diminution in numbers traced to decline of agriculture and the hope expressed that the present back-to-the-land movement will have a favorable effect upon the quail population.

The following quotation from Handley bears interestingly upon a burning question: "The expenditure in Virginia of $348,325 for the taking of 695,653 hawks, owls and crows, over the six years period, 1924-1929, may have saved some quail, but I am of the opinion that had the same amount of money been spent on lespedeza seed for distribution more would have been accomplished. Furthermore, since the paying of bounties has been stopped quail have continued to increase and are now more abundant than at any time when bounties were paid."

Life Histories: Grouse, Sharp-tailed

Grange, Wallace. The interesting sharp-tailed grouse, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 20 cents a copy), 40(4), April 1936, pp. 82-83.

Notes on mating behavior, character of range, food habits, and nomadism.

Life Histories: Pheasant nesting

Hamerstrom, Frederick N., Jr. A study of the nesting habits of the ring-necked pheasant in northwest Iowa, Iowa State College Journ. Sci. (Ames, Iowa), 10(2), 1936, pp. 173-203, 2 pls., 4 figs., 8 tables.

A careful study carried on during three breeding seasons (1933 to 1935) and covering 503 nests. Occurrence and fate of nests is discussed and tabulated according to types of cover; in most cases correlation was not pronounced. A preference was shown for nesting in edge zones, possibly proportional to the size of the block of cover. The average number of eggs in clutches varied from 10.1 to 12.4 in different years; for the three seasons the average was 11.2, the range 4 to 26. A decline in the number of eggs per clutch with the advance of the nesting season was observed. Fertility varied little, averaging 93.1 percent; viability showed greater variability. On the basis of 445 nests under regular observation, 76.9 percent were unsuccessful. Causes of failure: Man 52.3 percent; predators 19.3; abandonment 3.5; flooding 5.8; total lack of cover 0.9; and unexplained 18.1 percent. Again it is proved that it will pay man more to regulate his own actions than to concentrate on "vermin control".

Life Histories: Sex resistance to starvation

Errington, Paul L. Sex and resistance of bobwhites and ring-necked pheasants to starvation, The Auk (3200 22nd St. N., Arlington, Va., $1.00 a copy), 53(1), Jan. 1936, pp. 78-79.

The sexes of bobwhite average about the same in weight and resist starvation about equally. Males of ringneck pheasants are much heavier than females and under starvation do not lose weight as rapidly.

Life Histories: Winter survival of bobwhite

Errington, Paul L. The winter of 1934-35 and Iowa bob-whites, The American Midland Naturalist (University Press, Notre Dame, Ind. Issued irregularly and at varying prices), 17(2), March 1936, pp. 554-568.

Results of field study through the winter of bobwhite populations in Iowa and Wisconsin, particularly as to known or suspected causes of fluctuations. Most of the disappearances of coveys did not represent mortality, although mortality may have occurred after local migration. Again it is reported that "severity of bob-white winter losses from predators seems not to be correlated with the kinds and numbers of resident predators."

Management: Big game

MacDonald, H. H. Big game management, (Biological Cine, Dallas, Texas; present address of both publisher and author unknown), 183 pp. (3-1/2 x 7), illus., 1934.

A book written strictly from the hunter's point of view which, as developed, seems equally remote from those of the stockman and the "ultra-conservationist". In the Introduction, it is asserted that the results of big game conservation efforts in western grazing States in the past ten years have proved exceedingly discouraging. "In every degree of the grazing use of the ranges x x x there is damage to game animals on private, State, and Federal lands."

In Chapter 1, Land utilization and wildlife, the author defends the premise that big game was crowded by man and his domestic animals from the low ranges into the mountains. He adduces some support of this position, which if maintained, would invalidate deductions as to life zones so far as based on big game species. The Forest Service is criticized for allowing grazing policies to develop detrimentally to big game. "To what extent this recreational resource is permitted to develop and use these National Forest ranges will depend upon the influence of public opinion in opposition to the existing degree of the livestock grazing use, as dictated by sheep and cattle interests." (p. 13.)

Even so, the National Park Service is said to be worse for "with hunting permitted on the National Forests, state and private lands, there is

better conservation and management of the native fauna: game animals, predators, and others, than exists on the National Park areas." (p. 16.) Later the Biological Survey comes in for like attention relative to predatory animal control.

Some of the points made in summing up his chapter on land utilization are: "the conservation and development of wildlife resources is dependent upon the control and regulation of all land uses and policies conflictional to wildlife," all critical watersheds on the National Forests should be withdrawn from grazing use; "That all forms of wildlife and their range needs be given higher priority than livestock on the National Forests"; "That all overgrazed ranges on the National Forests be immediately closed to livestock"; "That all western National Forests having the highest values in wildlife, recreational, and natural wealth, be permanently closed to livestock and x x x administered in the special interests of wildlife and recreation"; "That the National Park lands be subject to a constructive wildlife policy and state regulations of proper seasons and removals x x x That predators, particularly coyotes, in all Parks, be reduced in density. That hunting be permitted on Park areas that have only National Forest values."

In connection with the enumeration of expenditures of sportsmen in a California game unit, the statement is made that "harvesting of the annual deer crop has a potential value of $100 per head." While estimates are made of the value of hunter travel, the author says, "it is impossible to place a monetary value on the privilege of viewing wildlife." (p. 30.) Other authorities do not agree as they believe the attractiveness of wildlife is a prime consideration in the choice of travel routes by tourists; they point out, moreover that the tourist season may be as much as 6 months while the hunting rarely exceeds 2, and often is much shorter. Data are presented (pp. 34-36) to show that money receipts from hunting may greatly exceed those from grazing. The advisability of wildlife management is urged and the importance of professionally trained widllife managers stressed. "Ultra-conservationists" come in for some hard knocks (pp. 38-39), a symptom of the lack of understanding of the hunters for that group and vice versa.

"Action should be taken to increase the game present to the full capacity of the ranges." (p. 42.) This suggestion should be qualified to the effect that the condition of the range at its worst, or during emergencies, should be given great weight, as it is the ultimate regulating factor. The appended suggestion "to make hunting grounds more accessible by construction of roads and trails" relates to an activity that in the view of many is already overdone.

The author argues mostly against refuges, especially large ones, and points out that "all areas are game preserves during the closed season." Big game management in his opinion should substitute regulated and directed hunting for refuges. In an ideal world this might be the solution, but in the face of poaching and other law violations so prevalent now, the superior practicability is evident of controlling irregularities on a definite refuge area rather than over the game range in general. It is pointed out that on

certain so-called refuges on the Natural Forests refuge values have been greatly diminished by livestock grazing within their boundaries. Adequate allotment of forage is of equal importance to conservation of wildlife and in fact should receive prior attention.

Useful browse and herbage lists based apparently on California data are presented on pages 74-76. With regard to mortality on certain overstocked areas, the author remarks: "These Kaibab losses, as well as other western game losses, can be largely attributed to stock grazing on the forage supply needed as supplementary range to winter game ranges." (p. 85.) "In order to maintain the productivity of the choice forage plants it is necessary that they be not damaged by a too-heavy use. This use should not exceed 60 to 70% and result in leaving 25 to 30% of the forage on the plants at the end of the growing season. The Forest Service permits livestock use up to 10 to 15%; this does not protect the choice species on the range or allow for them to continuously reproduce or even produce an abundance of leafage. That is the reason why the plants which should grow upright become stunted, spread out over the ground and produce less forage each year. As before stated, livestock are taken off the high ranges and taken to areas where the winter forage has been protected for fall use, such as spring-fall range. The forage on this range is then grazed heavily; then the stock are moved to further lower elevations or fed on ranches. The deer then drift onto the low ranges that have been just previously heavily used by the stock and are thus exposed to forage conditions that oftentimes do not even leave 10% of the leafage on the plants for the game survival." (pp. 121-22.) "All experiences and natural laws point that game animals and livestock cannot occupy the same range units to the full welfare of each group." (p. 141.) The livestock industry desires full use, hence requests elimination of forage-consuming wildlife. Much of this is the normal food of coyotes and other predators. These are then forced to turn to game which stimulates hunters to add their voice to the demand for predator control. "If the stockman had been willing to accept his losses to coyotes - which would have been negligible were the ranges properly grazed and reasonable numbers of grazing rodents permitted to live and provide coyote food - with as much indifference as he does those losses due to overstocking of the ranges, poisonous plants, drought, exposure, etc., nature would have been much more kind to him by conserving his range forage far better than his rodent control could do. As one of many examples, because of poisoning and trapping coyotes on southwest ranges, jack-rabbits have increased to the extent that their density and grazing of the grasses makes exactly the difference in forage utilization between normally stocked range and overgrazed range and that this combined use is causing the range to be further reduced by succession of valueless plants for both stock and rabbits, such as mesquite and prickly-pear. Present indications, as voiced by Arizona stockmen, are that coyote annihilation is not so desirable after all. To game management, this will also indicate the insecurity, lack of soundness and the strictly monetary trend of the stockman's predator control policy." (pp. 143-44.)

A work difficult to abstract, full of meat, but also dogmatic on controversial questions, and prejudiced, as never departing from the thesis that maximum production of game for hunting is the highest use for western ranges.

Management: Bobwhite in Iowa

Errington, Paul L. Iowa experiments with quail, Outdoor America (1167 Merchandise Mart, Chicago, Ill., 10 cents a copy), N.S. 1(7), May 1936, pp. 4-5, 16, 3 photos.

In Iowa the bobwhite, originally restricted in distribution, increased with crude, decreased with 'slick and clean' farming. Experience in the State indicates that "the problem of wise administration of the bobwhite is not only one of keeping the species from being shot out but one of keeping it from being farmed out, starved out, or otherwise endangered indirectly" and that administration "may be expected to fail or succeed according to its failure or success in handling MAN." Shooting within reasonable bounds is feasible and a take of around 50 percent permissible, preferably to be shot early in the season. A system of small inviolate refuges alternating with tracts of shooting ground is recommended as an automatic device to prevent over-shooting. Notes also on farmer-sportsman relationships, and value of erosion control to bobwhite and other small wildlife.

Management: Burning

Greene, S. W. Effect of annual grass fires on organic matter and other constituents of virgin longleaf pine soils, Journ. Agr. Research (Supt. of Documents, Washington, D. C., 15 cents a copy), 50(10), May 1935, pp. 809-822, 6 tables.

Another of Greene's interesting and valuable contributions on this subject. Organic matter in the soil depends on plant structures under the surface far more than on any mulch there may be on top of the soil. The agricultural practice of plowing under vegetation has no effective counterpart in nature, although anti-burning propaganda seems to be inspired by assumption that it has. Studies carried on for 8 years in southern Mississippi showed that there is 1.6 times as much organic matter in soils burned over every year as in the soils protected from fire. The burned-over soils also contained 1.5 times as much nitrogen as the unburned. Forage growth on ungrazed but burned areas was more than double that on unburned plots, and the crude-protein content of the principal forage grasses was higher. There was a great increase of native legumes on the burned land, the difference expressed in plants per acre being 27,600 on plots both grazed and unburned and 41,500 on those ungrazed and burned.

Copies of previously published articles "The Forest that Fire Made," 1931, and "Burning the Woods", may be obtained from Mr. Greene, McNeill, Miss., as long as the supply lasts.

Management: Cover improvement

Morton, James N. A game restoration job for everyone, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 7(2), May 1936, pp. 4-7, 24, numerous figs.

Illustrated suggestions as to improving refuge cover, use of flushing bar, preservation of nesting islands, and other essential cover.

Management: Deer requirements

Ehrhart, E. O. Forest management and deer requirements on the Allegheny National Forest, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(5), May 1936, pp. 472-474.

With reference to the suggestion of rotation cutting in the smallest practicable blocks by Gabrielson (Journ. Forestry, Feb. 1936, see Wildlife Review 3, April 1936, p. 25, and the present issue, p. 15), the author believes that "such a plan would not produce a maximum of food supply where and when it is most needed." Winter is when food limitations operate most decisively and winter range needs special attention. In the Allegheny National Forest this range is in valley bottoms where concentrated feeding tends to make openings in the stand providing opportunity for new growth. Deer are closely localized in winter feeding areas and are not likely to proceed to others even if better supplied. New growth following cutting, except in valleys, therefore, is unavailable. Frequent selective cuttings in valleys is the author's recipe for maintaining winter deer browse on the Allegheny National Forest.

Management: Farmer-sportsman relationships

Creveling, J. Q. How the account stands, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 7(2), May 1936, pp. 8-9, 3 photos.

The farmer-sportsman relationship from the hunter's point of view; thinks the farmer sufficiently compensated now by protection of insectivorous birds and fur animals, by bounties on predators, and personal hunting opportunities.

Management: Farmer-sportsman relationships

Titus, Harold. Confessions of an ex-commissioner, The Sportsman (10 Ferry St., Concord, N. H., 50 cents a copy), 19(4), April 1936, pp. 34-35, 60.

"Once upon a time I knew all the answers. x x x Now x x x my humility in the face of the identical problems is matched only by my earlier arrogance." Discussion that should do good by a real sportsman, noted writer, and member of the Michigan Conservation Commission for 8 years. He stresses lack of basic knowledge, need for research, necessity of sportsmen realizing

that fish- and game-cropping must be brought to an engineered basis. Propagation, restocking, providing public shooting grounds, in fact any and all, State action cannot satisfy demands of an annually increasing hunting and fishing army. In effect game and fish are under control of landholders and the only hope of a permanently working arrangement is cash return to the landowner. The author predicts that the system of paying for hunting rights will be accepted "grudgingly at first, but finally with enthusiasm."

Management: Forest game

Chapman, Herman H. Forestry and game management, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(2), Feb. 1936, pp. 104-106.

Abstracted as BS Leaflet 33, in Wildlife Review, 3, April 1936, p. 24.

Management: Forest game

Gabrielson, Ira N. The correlation of forestry and wildlife management, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(2), Feb. 1936, pp. 98-103.

Abstracted as BS Leaflet 37, in Wildlife Review, 3, April 1936, p. 25.

Management: Harvesting

Chapman, Floyd B. Report on State hunting preserves, 1935, Ohio Division of Conservation (Columbus, Ohio), Bul. 97, 9 pp., 1936, mimeographed

Report on results of the first opening of 3 State preserves to hunting. Hunters were checked in and out, their game examined, and observations recorded. On one of the preserves, of 3,333 squirrels seen, 2,018 were killed. The cost to the hunter per squirrel was not less than $1.37 and all incidentals figured in may have been as much as $5.00. Data are given on weights of squirrels (average 17 ounces), representation of sexes (about even), and infestation by fly larvae (warbles). Somewhat similar data are given for rabbits, and in addition a tabulation of all wildlife seen by the hunters.

Management: Harvesting deer

Trippensee, R. E. Cooperative deer hunting. Control of wildlife harvest imperative to good management, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 24(6), Nov.-Dec. 1935, pp. 87, 92-93, 2 photos.

Cooperative deer hunting, supervised and checked, an effort to make deer hunting in National Forests a safer and better sport. Statistics are given for the 1934 season in 8 Forests in Minnesota, Wisconsin, and Michigan. They show the number of hunters, the head of deer killed, the proportion of

successful hunters, and the acreage to each deer harvested, and to each hunter. Where the hunters were the most scattered, there was a greater possibility of each getting a deer.

Management: Illinois plans

Frison, T. H. The Illinois Natural History Survey - its relation to conservation, Illinois Conservation (Dept. of Conservation, Springfield, Ill.), 1(2), 1936, pp. 4-5.

Brief statement of the history and organization of the Survey, and its program with respect to wildlife management and aquatic biology.

Management: Illinois plans

Murdoch, Earl C. Soil Conservation Service inaugurates wildlife management program, Illinois Conservation (Dept. of Conservation, Springfield, Ill.), 1(2), 1936, p. 3.

Plans for the work in Illinois especially with reference to improvement of cover and provision of feed patches.

Management: Multiple use of forest land

Gordon, George B. Forests, land, and water, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 33(11), Nov. 1935, pp. 896-899.

A plea for the development of fish, game, and other recreational resources of forested areas. "The writer is certain that once we foresters have demonstrated that we can not only grow forests, but use land and water as well, our future as a profession will be secure. The owner of wild lands must and will have ann ual returns from his properties. Let us help him to produce trout and salmon, grouse and deer, as well as timber."

Management: Planting mountain-ash

Anon. Propagation of mountain ash, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), March-April 1936, pp. 13-14, multilithed.

Brief report on German tests with Sorbus aucuparia, probably applicable to Sorbus americana. Fall sowing of cleaned seed is recommended.

Management: Permissible shooting

Errington, Paul L. Shooting and bobwhite populations, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 20 cents a copy), 40(4), April 1936, pp. 79, 91-93, 1 photo.

As a result of Wisconsin and Iowa studies, it was "found that if the wintering population exceeded the carrying capacity of the land, the surplus birds either had to get out or they would be killed by predators. x x x If bobwhites are to be managed for sporting purposes, the one effective method of preventing the loss of the surplus through winter predation is to harvest it first." These statements, out of their context, may seem rather dogmatic but they are properly cushioned by references to quality of data, and to technical difficulties in enumerating quail populations, as well as by advice against going too far with shooting under the stimulus of comforting advice without constantly checking back to the actual facts as to the bobwhite population involved.

Management: Range rehabilitation

Vorhies, Charles T. Wildlife aspects of range rehabilitation, Hoofs and Horns (121 E. 10th St., Tucson, Ariz., 10 cents a copy), 5(8), Jan. 1936, pp. 6-7, and 5(9), Feb. 1936, pp. 10-11.

Rodents unduly blamed for erosion, not as destructive as alleged and expenditure for their control for that reason and also as forage consumers out of proportion to the value of the work; figures are given. Extirpation of beaver by trappers a prime factor in causing destructive erosion. Revegetation of range will be beneficial to wildlife "only to the extent that domesticated stock is not increased to again consume the additional forage and destroy the added cover". Reduction of livestock is the most important thing that might be done to restore the range.

Management: Small upland refuges

Gordon, Seth. New small game program launched, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 7(2), May 1936, pp. 2-3, 13, 2 figs.

Proposal to secure benefits similar to those resulting from large refuges in forested regions by creating small refuges in agricultural districts, a plan, the success of which is yet to be demonstrated. Notes on the system of deer refuges and public shooting grounds, and the worth of small forest refuges to wild turkeys, ruffed grouse, and squirrels. Doubts expressed as to the value of distribution of imported rabbits.

Management: Trail cutting in relation to deer

Robinson, Cyril S. Truck trails and firebreaks; their use by deer on the Santa Barbara National Forest, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 33(11), Nov. 1935, pp. 940-942.

Deer are not driven out by trail invasion of their habitat. The change in ecological conditions produces a new mixed growth of which the deer are quick to take advantage. Notes on utilization of 5 browse species.

Management: Wildlife in land planning

Preston, John F., Chairman. Allegheny Section Committee Report on Land Policy, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(5), May 1936, pp. 503-505.

"Mountain forests and recreation and wildlife areas constitute the principal classes of land where public ownership can hardly be questioned." Wise use "is any method of treatment which keeps such lands productive of the product to which they are chiefly suited or for which they have been set apart, whether it be timber, wildlife, recreation, or scenery." Why not all uses so far as they can be harmonized?

Management: Wildlife inventories

Hosley, N. W., Chairman. Forest wildlife census methods applicable to New England conditions, Journ. Forestry (Mills Bldg., Washington, D.C., 65 cents a copy), 34(5), May 1936, pp. 467-471.

Importance of inventory of stock in wildlife management. Suggestions as to methods of counting deer and ruffed grouse with briefer reference to other groups. Bibiliography of 9 titles.

Propagation: Cottontail rabbit

Dunn, Malcolm. Propagating cottontail rabbits, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 6(4), April 1936, p. 7.

In an initial test with 7 does and 2 bucks on an acre of ground there was an increase of 75 young rabbits. Later and more extensive efforts as usual in game propagation brought diminishing returns. Experience (details given) taught desirable practices in penning and feeding and the work will be continued.

Propagation: Distribution of game birds

Bade, August. California system of game bird propagation and distribution, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 20 cents a copy), 40(4), April 1936, pp. 75-76, 2 photos.

"The California system as it stands today consists of artificially produced birds - disease free and hardy; holding pens, constructed according to our specifications, but paid for and owned by the sportsmen, for the distribution of game birds, and closed areas, made possible by the cooperation of land owners, in which to plant birds where they will have food, water, and protection." The birds are sent to the pens at 30 days and held about 7 weeks before liberation. The system has greatly increased the capacity of the State rearing system for game bird distribution and has reduced the cost. Significant sentence: "about 90 percent of all land owners are more than willing to have their land included in a closed area."

Propagation: Irradiation results

Bissonnette, T. Hume, and Albert G. Csech. Eggs by pheasants and quail induced by night-lighting, Science (Lancaster, Pa., 15 cents a copy), 83, April 24, 1936, p. 392.

Application to pheasants and quail of Bissonnette's earlier (1933) findings from starlings; birds brought into full egg production in January.

Propagation: Irradiation results

Clark, Leonard B., Samuel L. Leonard, and Gardiner Bump. Light and reproduction in game birds, Science (Lancaster, Pa., 15 cents a copy), 83, March 13, 1936, p. 268.

Grouse, quail, and pheasants were irradiated daily for 6 hours after sunset for one month. The results "show that light has a profound stimulating effect upon the reproductive organs".

Propagation: Pheasant

Clausen, George C. Caring for pheasants before and during the breeding season, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 6(3), March 1936, pp. 7-8.

A large number of suggestions about minor as well as major points in pheasant rearing gleaned from a successful breeder's experience. This article symbolizes a change in the game bird rearing business; formerly such individually acquired knacks were kept as secret as possible.

Propagation: Pheasant; artificial incubation and brooding

Anon. Artificial incubation and brooding of ringneck pheasants, Pennsylvania Board of Game Commissioners (Harrisburg, Pa.), 1936, 12 pp., 5 pls., mimeographed.

Description of the use of a combined forced draft and still air incubating system by the State game farms. Brooder house construction and use. Handling and feeding chicks. Formulas for a rearing mash and scratch food.

Propagation: Pheasant, care of young

Clausen, George C. Feeding pheasant poults, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 6(4), April 1936, pp. 6-7.

Warmth and quiet prime necessities for the first 48 hours. In feeding commercial mashes replace the long used egg food and custard. Suggestions as to changes in diet corresponding to age. Care of the young birds on the rearing field, and also of breeding stock, especially during the moult.

Propagation: Pheasants, Fancy

Denley, Charles F. Ornamental pheasants, their breeding and care, 93 pp., 11 half-tones, 1 line cut. 1935. (Apparently obtainable from the author, Glenmont, Md., also from Modern Game Breeding and Hunting Club News, 28 W. State St., Doylestown, Pa. $2.50 a copy.)

Account of the author's methods developed in 33 years' experience. Shelter, runs, feeding, watering, choice of stock, breeding, care of eggs, use of foster mothers, care of young, diseases and maladies and their treatment. Special chapters on peacock and impeyan pheasants and on peafowl. Bibliography of 16 titles.

Propagation: Pheasant; hen system

Anon. Hatching and rearing ringneck pheasants, Pennsylvania Board of of Game Commissioners (Harrisburg, Pa.), 1936, 16 pp., 6 pls., mimeographed.

Instructions primarily for those receiving eggs from the State Game Farm, as to care of eggs, and broody hens, construction and care of sitting boxes and rearing coops, and feeding the chicks.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS.

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of those mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-41 to BS-50. Fruits attractive to birds, by W. L. McAtee, April 1936.

Each of these ten leaflets contains a brief general discussion of the region to which it pertains, a map outlining the regions adopted, a table listing genera of fleshy fruits most attractive to birds throughout the United States, and a brief bibliography of chiefly recent publications on the native and cultivated trees and shrubs. Each leaflet contains lists of native species of the favored fruit-bearing genera with notes on the fruiting season, and in most cases also lists of extralimital fruits that have been recommended as a result of trial by the Agricultural Experiment Stations and other agencies.

Definition of the region treated and information as to pages, etc., are herewith given in connection with the serial numbers of these 10 leaflets.

BS-41. Region No. 1 - Northwestern States [Washington, Oregon, and Idaho]. 14 pp., 10 tables, 1 map.

BS-42. Region No. 2 - Rocky Mountain States [Montana, Wyoming, and Colorado]. 12 pp., 8 tables, 1 map.

BS-43. Region No. 3 - Northern Plains States [North Dakota, South Dakota, Nebraska, and Kansas]. 13 pp., 7 tables, 1 map.

BS-44. Region No. 4 - Northeastern States [Minnesota, Wisconsin, Michigan, New York, Vermont, New Hampshire, Maine, Massachusetts, Connecticut, Rhode Island, Iowa, Illinois, Indiana, Ohio, Pennsylvania, New Jersey, West Virginia, Maryland, Delaware, Missouri, Kentucky, and Virginia]. 26 pp., 18 tables, 1 map.

BS-45. Region No. 5 - California. 14 pp., 5 tables, 1 map.

BS-46. Region No. 6 - Great Basin States [Utah and Nevada]. 9 pp., 4 tables, 1 map.

BS-47. Region No. 7 - Southwestern States [Arizona and New Mexico]. 10 pp., 5 tables, 1 map.

BS-48. Region No. 8 - Southern Plains States [Texas and Oklahoma]. 12 pp., 7 tables, 1 map.

BS-49. Region No. 9 - Southeastern States [Arkansas, Tennessee, North Carolina, Louisiana, Mississippi, Alabama, Georgia, and South Carolina]. 12 pp., 3 tables, 1 map.

BS-50. Region No. 10 - Florida. 13 pp. 4 tables, 2 maps.

BS-51. Local control of magpies, by E. R. Kalmbach, April 1936, 8 pp., 1 pl.

Economic status of the magpie; need of local control; destroying eggs and young; trapping; poisoning. A trap, suet stick, and suet block illustrated.

BS-53. Bird banding, April 1936, 5 pp.

Brief history of the movement; qualifications of cooperators, including permits; discussion of possible harm to birds; description of bands and their use; notes on traps and on value of the work.

BS-57. Marking wild animals for identification, by Frank G. Ashbrook, May 1936, 3 pp., 1 fig.

Tattooing and tagging ears; toe clipping; addresses of dealers in electric tattoo instruments, tattoo punches, and ear tags.

SPECIAL ARTICLES

The articles in this issue are contributed by the organizations to which they refer. That in Wildlife Review No. 3 (April 1936, pages 27-30) was expanded by the Editor from a statement furnished by Dr. A. J. Pieters of the Division of Forage Crops and Diseases.

Wildlife management of the National Park Service

The wildlife policy of the National Park Service aims to perpetuate all native wildlife forms, whether game or non-game, under natural conditions. Each species is left to carry on its struggle for existence unaided, as being to its ultimate greatest good, unless there is real cause to believe that it will perish if unassisted. Conservationists have come to depend on the National Park Service, together with the other Government agencies, to protect the prized remnants of our almost vanished large mammals and animals intolerant of the advances of civilization. Section I of the Act of August 25, 1916, to establish a National Park Service states, in part, that the purpose of national parks, monuments, and reservations is to "conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Considering the joint use of parks by animals and man, one gets some conception of the complexity of the national park wildlife problem. As practiced by the National Park Service, wildlife management consists in the maintenance, so far as possible, of primitive faunal conditions in areas where the annual human attendance is steadily mounting. Since wildlife of the wilderness is affected by human use of the park areas, which are frequently inadequate biological units, such management is necessary in order that some of the rarer species, such as the wolverine and trumpeter swan, do not disappear altogether, and that other more adaptable species do not increase beyond the carrying capacity of the range so as to ultimately exterminate themselves.

Most of the national parks act as wildlife refuges and dispersal from them aids in stocking the surrounding territory. When contiguous lands are not available for range for some of the larger forms such as elk and bison, active control measures are enforced upon the National Park Service. In such cases the problem then becomes a matter of disposal, controlled public hunting outside the park boundaries, or removal for restocking in depleted areas. Yellowstone National Park has been a most important source of elk for restocking various portions of the formerly extensive range of this species. Within the past two years, the animals removed have been sent to Montana, Idaho, South Dakota and Virginia. The Crow Indian Agency has been interested in restocking big game animals and has obtained elk and bison from the Yellowstone.

Although hunting and trapping is prohibited in national parks, fishing is permitted in most of the lakes and streams. It is not, however, contemplated that angling will be encouraged or permitted in all waters, as the value of an aquatic as well as a terrestrial wilderness is recognized. Since the public seems to consider that fishing, where allowed in national park waters, should be superior to that outside, hatcheries and rearing pools have been established in a number of the parks in an effort to meet this demand. The Emergency Conservation Work program has made increased improvements of this type possible. In the past, exotic fish have been introduced into some waters, but, under a recently defined policy, only native species will be used in the future for restocking new waters.

The National Park Service and the U. S. Bureau of Fisheries maintain a cooperative agreement which consists of an exchange of fish and spawn for restocking waters within and outside of the national parks.

Prior to the inception of the Emergency Conservation Work program, the Wildlife Division consisted of three employees, one of them a fish expert. Under ECW a number of trained biologists have been added to the staff. These men conduct surveys and plan and supervise CCC projects beneficial to wildlife. Some of these projects are food and cover planting, construction of fish rearing ponds and development of wildlife waterholes.

A new phase of National Park Service activity is the cooperation extended through the operation of CCC camps on State, county, and municipally owned park areas. While, in general, this type of work has consisted mainly of construction facilities for intensive recreation on relatively small areas, there is a very definite wildlife conservation aspect to this program, not only from the standpoint of the preservation and restoration of wildlife habitats but from the intimate contact which large numbers of people have with the wildlife. Perhaps the fact that State, county, and municipal park administrators are becoming aware of the value of wildlife under natural conditions as a phase of outdoor recreation will be one of the outstanding and lasting achievements of this work. The nature of the wildlife work in these smaller, locally owned units follows the general policy of work done upon national parks, but the problems differ. In the former, the wildlife technicians of the Service have been more concerned with the prosecution of the work and less with policy-forming functions carried on in the national parks where the Service has exclusive jurisdiction.

Wildlife management of the National Park Service is a problem not of rearing a crop of game to be harvested by the gun, but in perpetuating native forms under natural conditions for the esthetic, cultural, and scientific use of the public.

For a more detailed description of the wildlife policies and management of the National Park Service, the following publications should be consulted:

Wright, George M., Joseph M. Dixon, and Ben H. Thompson
Fauna of the National Parks of the United States (Supt. of Documents, Washington, D. C., 20 cents a copy), May 1932, (1933), 157 pp., 56 figs.

This report is the first of a series on the vertebrate fauna of the national parks. Problems involving conservation of the biota are discussed. The report is the result of a preliminary wildlife survey to establish a National Park Service wildlife policy, to aid resident park officials in handling difficult animal problems, to determine the existing status of wildlife species, to analyze unsatisfactory conditions, and to set up a plan for the development of wildlife management.

The report discusses the original fauna of each park and its history during the period of white man's influence, surveys the present wildlife situation and develops a management plan. Problems arising from the joint use of wilderness areas by man and animals are described.

The status of big game species, predators, fur-bearing mammals, waterfowl, and other birds in each park is given.

The report sets up a well-defined policy for the protection and preservation of all species in national parks and monuments in order to present a natural wildlife picture independent of man.

Wright, George M., and Ben H. Thompson
Fauna of the National Parks of the United States (Supt. of Documents, Washington, D. C., 20 cents a copy), Fauna Series No. 2, July 1934 (1935), 142 pp., 61 figs. Abstracted in Wildlife Review No. 1, September 1935, p. 19.

Wright, George M.
Big Game of our National Parks, the Scientific Monthly, August, 1935, Vol. XLI, pp. 141-147. Abstracted in Wildlife Review No. 2, January 1936, p. 15.

Borell, A. E.
Preservation of Wildlife in National Parks of Southwest is Big Problems, New Mexico (208 W. Gold Ave., Albuquerque, N. M., 15 cents a copy), 13(11), Nov. 1935, pp. 30, 31. Abstracted in Wildlife Review No. 2, January 1936, p. 15.

Thompson, Ben H.
History and Present Status of the Breeding Colonies of the White Pelican (Pelecanus erythrorhynchos) in the United States. Contribution of Wildlife Division, Occ. Paper No. 1, 1933, National Park Service, Washington, D. C., 82 pp., 3 figs.

The decline in numbers and major nesting colonies of the white pelican in the United States is shown, together with notes on the status of the birds in Canada. Much information has been compiled from literature and correspondence with field observers. Particular attention is paid to the Yellowstone Park colony, formerly controlled, but now fully protected. Regarding the value of pelicans, the author states that "where actual investigations have been made, in the majority of cases the pelicans have been found to feed principally upon fish of little or no human value." More research on the value of white pelicans is needed but present information shows that "the pelican is not the destructive pest it is assumed to be." The author believes that the pelican may prove to be exceedingly valuable as a control upon non-game, non-commercial fish, and, therefore, of indirect benefit to more desirable species.

House of Representatives, 74th Congress, First Session
Conservation of Wildlife. Hearings before the Select Committee on Conservation of Wildlife Resources, Part I, U. S. Government Printing Office, Washington, D. C., 1935, pp. 1-121. Statements of Arno B. Cammerer, Director, National Park Service, and George M. Wright, Chief, Wildlife Division, National Park Service. 69-92. Abstracted in this issue of Wildlife Review, p. 2.

A summary is given of the activities of the National Park Service in wildlife conservation including the functions of the Wildlife Division and the wildlife technicians employed under the Emergency Conservation Work Program. The fish planting policy of the National Park Service is reviewed.

News and information leaflets under the title of Nature Notes are issued by National Parks as follows:

Acadia -- Issued bimonthly by the Park Naturalist of Acadia National Park, Bar Harbor, Maine. No price quoted.

Crater Lake -- Issued during July, August, and September by Naturalist Division, Crater Lake National Park, Medford, Oregon. No price quoted.

Glacier -- Issued monthly by the Park Naturalist and distributed by the Educational Division, Glacier National Park, Belton, Montana. No price quoted.

Grand Canyon -- Issued monthly by the Grand Canyon Natural History Association, Grand Canyon, Arizona. Ten cents per copy or $1.00 per year.

Hawaii -- Issued bimonthly, Hawaii National Park, Hawaii. No price quoted.

Hot Springs -- Issued irregularly, Hot Springs National Park, Arkansas. No price quoted.

Lassen Volcanic -- Issued occasionally, Lassen Volcanic National Park, Mineral, California. No price quoted.

Mount Rainier -- Issued quarterly by the Naturalist Department, Mount Rainier National Park, Longmire, Washington. No price quoted.

Rocky Mountain -- Issued quarterly with the cooperation of the Rocky Mountain Nature Association. Dorr G. Yeager, Park Naturalist, Rocky Mountain National Park, Estes Park, Colorado. No price quoted.

Yellowstone -- Issued regularly, Yellowstone National Park, Yellowstone Park, Wyoming. No price quoted.

Yosemite -- Issued monthly by the Yosemite Natural History Association, Yosemite National Park, California. No price quoted.

Zion -- Issued monthly by the Superintendent, Zion National Park, Utah. No price quoted.

National Parks Bulletin, issued irregularly, no price quoted, is the organ of The National Parks Association, 700 Twentieth St., N. W., Washington, D. C.

Wildlife aspects of the Resettlement Administration land program

More than 3,800,000 acres of misused and idle land are being devoted to wildlife through the land use program of the Resettlement Administration. Thirty-seven projects included in this program are being developed primarily for wildlife protection, while 133 additional projects have wildlife conservation included in the end uses of the land along with forestry, grazing, and recreation.

A total of 738,000 acres is being acquired in cooperation with the Bureau of Biological Survey for use as migratory waterfowl refuges. Comprising 32 different project areas, these lands are strung along the major flyways of the Mississippi Valley, the Atlantic and Gulf Coasts, and the Pacific Northwest. In the dry areas of the northern plains, these projects, which include large areas of land to be re-flooded, will serve a dual purpose of conserving water and providing bird refuges. Development of these lands is now being undertaken by the Biological Survey.

An outstanding project of this kind is the Lower Souris Refuge in North Dakota, embracing an area of 38,000 acres and extending a distance of 40 miles along the river. Construction of eight dams will enable the control and conservation of spring floods to maintain desirable water levels.

The five other projects devoted primarily to wildlife protection consist of submarginal farms and adjoining tracts which will be utilized primarily for upland game conservation. Prominent among them is the New York Wildlife Project, in which 32,000 acres are being acquired in nine separate tracts. The areas will later be turned over to the State of New York for administration. In the meantime development work is being carried on by the Resettlement Administration to improve the game cover, increase natural food supplies, make game reconnaissances, institute predatory animal control, and improve ponds and streams.

The Resettlement Administration is buying more than 9,000,000 acres in all under its land use program, and in all projects where possible, game conservation will be carried out in conjunction with other uses. Wildlife management on these lands is often one of the important economic factors in restoring idle and wasted lands to a state of productive value.

The Sandhills project, a 60,000-acre tract in North Carolina, is a multiple use project of this type, where wildlife development is coordinated with reforestation, erosion control, and recreation. Hatcheries are being built on Lake McKinney to restock streams and lakes in the project area and a game farm and food and cover areas are being established. Other developments which have an indirect bearing on wildlife include the construction of 14 dams, and reforestation on 16,000 acres.

In the Little Missouri project in North Dakota where the topography ranges from gently rolling plains to canyons, conservation of upland game is being undertaken in connection with use of the land for grazing purposes.

The work of the Resettlement Administration is organized on a twelve-regional basis and some forty game managers and wildlife specialists are at present employed. Their distribution by States is as follows: Alabama 1, Arkansas 1, Connecticut 3, Florida 9, Georgia 6, Indiana 1, Maryland 1, Michigan 1, Minnesota 1, New York 4, Ohio 1, Oklahoma 1, South Carolina 6, Texas 1, and Wisconsin 7.

BIOLOGICAL BIBLIOGRAPHIES

Sporting magazines and conservation department organs

[Supplement; previous installment in Wildlife Review No. 3, pp. 32-34.]

Of general scope

Chase Magazine. Monthly, $2.00 a year. Hernando Bldg., Lexington, Ky. (Devoted to fox hunting.)

Hounds and Hunting. Monthly, $1.50 a year. 250 S. Park St., Decatur, Ill.

Hunting and Fishing. Monthly, 50 cents a year. National Sportsman Co., Inc., 275 Newberry St., Boston, Mass.

Red Ranger. Monthly, $1.00 a year. Rushville, Mo. (Devoted to fox hunting.)

Of local scope

California Conservationist. Monthly, $1.00 a year, single copy 15 cents. Department of Natural Resources, State Office Bldg., Sacramento, Calif.

Illinois Conservation. Quarterly, no price quoted. Department of Conservation, Springfield, Ill.

South Dakota Conservation Digest. Monthly, mimeographed. Game and Fish Department, Pierre, S. Dak.

Wisconsin Conservation Bulletin. Monthly, mimeographed. Conservation Department, Madison, Wis.

Wyoming Wild Life. Monthly, mimeographed. State Game and Fish Department, State Capitol Bldg., Cheyenne, Wyo.

American periodicals relating to birds and mammals

Birds

The Archaeopteryx. Mimeographed. Saint Anselm's College Ornithological Soc., Manchester, N. H.

Audubon Annual Bulletin. No price quoted. Illinois Audubon Society, Chicago, Ill.

Audubon News-Letter. Monthly, mimeographed, no price quoted. Audubon Society of Missouri, 690 Bonita Ave., Webster Groves, Mo.

The Audubon Year Book. $1.00 a copy. Indiana Audubon Society, 4030 Park Ave., Indianapolis, Ind.

The Auk. Quarterly, $4.00 a year, single copy $1.00. American Ornithologists' Union, 3200 22nd St., N., Cherrydale, Va.

Bird-Lore. Bi-monthly, $1.50 a year, single copy 30 cents. Harrisburg, Pa.

Bird Migration Memorandum. Annually, multigraphed. U. S. Biological Survey, Washington, D. C.

Bulletin of the Ornithological Club of Massachusetts. Annually, 50 cents a copy. Essex County Ornithological Club of Mass., Inc., Salem, Mass.

The Cardinal. Semi-annually, 50 cents a year, single copy 25 cents. The Audubon Society of the Sewickley Valley, Edgeworth, Sewickley, Pa.

Cassinia. Biennially, $1.00 a copy. Proceedings of the Delaware Valley Ornithological Club, Academy of Natural Sciences, Philadelphia, Pa.

The Condor. Bi-monthly, $3.00 a year, single copy 50 cents. Cooper Ornithological Club, Museum of Vertebrate Zoology, Berkeley, Calif.

The Flicker. Quarterly, 50 cents a year, single copy 15 cents. 4405 Lyndale Ave. So., Minneapolis, Minn.

The Gull. Monthly, $1.00 a year, single copy 15 cents. Audubon Association of the Pacific, 1695 Filbert St., San Francisco, Calif.

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The Migrant. Quarterly, 75 cents a year. Tennessee Ornithological Society, Nashville, Tenn.

The Nebraska Bird Review. Quarterly, $1.00 a year, single copy 25 cents. Nebraska Ornithologist's Union, Lincoln, Nebr.

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The Wilson Bulletin, Quarterly, $1.50 a year, single copy 50 cents. Wilson Ornithological Club, Sioux City, Iowa.

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Bird Banding. Quarterly, $2.00 a year, single copy 50 cents. Charles B. Floyd, 95 South St., Boston, Mass.

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Birds and Mammals

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Fur Animals. Monthly, $1.00 a year. Gough Publishing Co., Kansas City, Mo.

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A preliminary survey of deeryards in the Upper Peninsula of Michigan, Papers of the Mich. Acad. Sci., Arts, and Letters, 10, 1928 (1929), pp. 411-416, fig. 30.

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Clepper, Henry E.
The deer problem in the forests of Pennsylvania, State Dept. Forests & Waters, Bul. 50, 45 pp., 17 figs., 6 tables, 1931.

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Dayton, Wm. A.
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Townsend, M. T., and M. W. Smith
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Compiled information mostly relating to Michigan, New York, and Pennsylvania. See present entries under Bartlett, Clepper, and Maynard.

Wakeman, Max C.
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NOTES AND NEWS

Bird Migration Memorandum No. 1, issued by the Biological Survey, April 1, 1936, contains notes on length of service of numerous migration observers and a summary of the spring migration of 1935, chiefly in tabular form.

Monthly Report on Impending Programs of Land Drainage and Water Storage, No. 2, April 1, 1936, issued by the National Resources Committee, lists many projects the object of which is given as 'fish and game protection'.

The ninth and last appointment under the present program of Cooperative Research in Wildlife Management was made April 9 by the transfer of Dr. Lawrence E. Hicks from the Soil Conservation Service to the Biological Survey to take charge of the work in Ohio. A statement similar to those made for the previously established projects in WILDLIFE REVIEW, No. 2, Jan. 1936, pp. 25-29, follows:

Ohio State University, Columbus.

Lawrence E. Hicks.

Otterbein College, BS, 1928; Ohio State University, MS, 1929, Ph.D., 1933; Research Ornithologist, Ohio Division of Conservation, 1929-1930; instructor, Department of Botany, Ohio State University, 1929-1934; forest ecologist, New York State Museum, 1931; biologist, in charge Region 3, U. S. Soil Conservation Service, 1934-1936; U. S. Biological Survey, biologist, 1936-

Member, Sigma Xi, Gamma Alpha, Ecological Society of America, American Association Advancement Science, Fellow of Ohio Academy of Science, American Ornithologists' Union (life), Wilson Ornithological Club (life) (Secy. 1931-), Cooper Ornithological Club (life), American Society Mammalogists, American Limnological Society, American Botanical Society, Inland Bird-Banding Association (Vice-President 1934-), American Society of Wildlife Specialists, Biological Society of Washington.

Principal papers: About 120 scientific papers on Ornithology (ecology, distribution, life histories, starling, bird banding, faunal papers), Botany (taxonomic and ecological studies of aquatics, floral papers, vegetation and forest ecology surveys), and Wildlife conservation (life histories of game species, measurements of animal populations, management recommendations, conservation principles).

The Pennsylvania Board of Game Commissioners announces the establishment of a training school for student officers in game administration. Objectives of the school are to assure fully qualified and trained officers in all branches of the field service, to increase efficiency in game protection and management, and to reduce administrative costs. Courses of instruction will include such special subjects as legal procedure, wildlife conservation methods, refuge acquisition and management, propagation and restocking, and game management.

The general purposes of the Soil Conservation and Domestic Allotment Act, namely, of keeping vegetative cover on the land and encouraging agricultural practices that will combat erosion, would seem to harmonize well with programs for the benefit of wildlife. It was thought that a general program of feed patch planting might be fitted in but the regulations differ so considerably by regions that this has not proved practicable. The results to date are not as extensive as hoped for, but they do constitute a worth while beginning and recognition of the right of wildlife to consideration.

One of the practices for which reimbursement to farmers may be made that has adaptability to the needs of wildlife is the seeding of soy beans,

velvet beans, cowpeas, sweet clover, lespedeza, and crotalaria when such crops are not grazed or pastured, or are not harvested for hay or seed, and the entire growth is allowed to remain on the land for cover over the winter. Payment at various rates can be made for this practice in the East Central Region, including the States of Delaware, Maryland, Virginia, West Virginia, Kentucky, Tennessee, and North Carolina. Another example is the use of sorghums, sudan grass, and millets when left on the land in States of the Southern Region, namely, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Oklahoma, and Texas, and still another the use of sorghums and sudan grass in specialized strip cropping in certain counties of New Mexico. Where such practices involve the use on acreage formerly in soil-depleting crops of approved soil-conserving and soil-building practices, payments may amount to $10.00 or more per acre.

State Conservation Commissions have been asked to give publicity to the opportunities that seem to exist for increasing winter cover and food supply for wildlife and to cooperate with State and County Agricultural Conservation Committees through which the Soil Conservation and Domestic Allotment Act will be largely administered.

Exclusive of the District of Columbia headquarters office force, the Soil Conservation Service has the following numbers of biologists, foresters, etc., assigned to wildlife management work in the States named: Arizona 3, California 2, Colorado 2, Georgia 1, Idaho 2, Illinois 2, Iowa 2, Kansas 2, Maryland 1, Minnesota 6, Mississippi 1, Missouri 1, New Mexico 6, New York 2, North Carolina 17, North Dakota 2, Oregon 1, Pennsylvania 3, South Carolina 2, South Dakota 3, Texas 2, Utah 1, Washington 2, West Virginia 1, and Wisconsin 8.

The Forest Service, Region 8, has entered into cooperative agreements with the States of Georgia and Tennessee calling for active management of wildlife (including fishes) on a half-million acres of National Forest in northern Georgia, and on a 125,000-acre demonstration area in Tennessee, and providing for equal division of receipts from license fees for limited and regulated hunting and fishing on these tracts.

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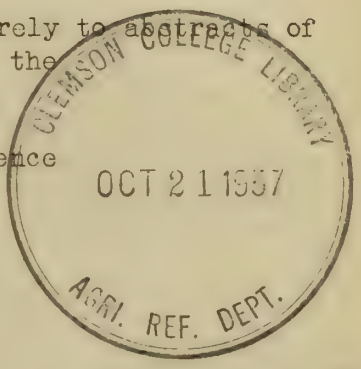
WILDLIFE REVIEW

AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
ISSUED FOR THE INFORMATION OF COOPERATORS
BY THE
BUREAU OF BIOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF AGRICULTURE

This issue of WILDLIFE REVIEW is devoted entirely to abstracts of papers on wildlife restoration and conservation from the

Proceedings of
the North American Wildlife Conference
held in Washington, D. C.,
February 3-7, 1936.



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Washington, D. C. No. 6 November, 1936

FOREWORD

The Proceedings has been issued in an edition of 1,000 copies as Committee Print for the Senate Special Committee on Conservation of Wildlife Resources (74th Congress, 2d Session, xii+675 pp., September 1936). It is understood that this printing is exhausted but a larger and illustrated edition now in press is to be distributed by the U. S. Biological Survey.

The printed report contains a copy of the program of the meeting which is in effect a table of contents, records the remarks in full of most speakers and part of the discussion, and includes an index to titles and authors. The following tabulation shows the sections in which papers bearing on wildlife management are given, the inclusive pages of the sections, and the number, respectively, of addresses and special papers on the program, of those actually printed, and of those here abstracted.

Papers from the 1936 North American Wildlife Conference bearing on Wildlife Management

Sections	Inclusive pages	Number of addresses and special papers on program	Number printed	Number here abstracted
General Sessions (4-1/2 days)	1-274	42	83	27
Special Sessions (1/2 day each)				
Farmer-sportsman Cooperatives	275-296	6	6	5
Fish Management	297-342	11	11	0*
Upland Wildlife Research	343-370	7	5	5
Game Breeding	371-395	7	6	5
Forests and Forest Wildlife	396-427	8	7	7
Stream and Lake Improvement	427-468	9	9	0*
Wildlife Disease and Population Cycles Research	469-493	8	7	7
Research in Waterfowl Problems	494-530	10	9	9
Pollution	531-575	8	9	1*
Practical Wildlife Management	576-618	9	7	6
Fur Resources Management	619-638	1	7	6
The Problem of Vanishing Species	639-666	9	8	5
TOTALS		135	174	83

While fish management is regarded as a phase of wildlife management, papers on that subject (sections starred) are not abstracted in WILDLIFE REVIEW, a product of the Biological Survey, Department of Agriculture, because all fisheries work in the Government Service is assigned to the Bureau of Fisheries, Department of Commerce. Of the programs of the sections on Fish Management, Stream and Lake Improvement, and Pollution, only one paper is herewith abstracted, namely, that of F. C. Lincoln, entitled "The Effect of Oil Pollution on Waterfowl."

Conservation: Agencies and functions

Barker, Elliott S. [Restoration; management by public agencies], pp. 175-181.

Defines spheres of State and Federal jurisdiction; suggests a satisfactory organization of a State conservation department; problems and performance illustrated from New Mexico experience; necessity of inventories of wildlife and its environment. "Restoration and maintenance of habitat is the all-important feature in game management." Results of restocking and management in New Mexico; coordination of grazing and wildlife interests; cooperation with landowners. Conservation agencies and their functions defined from a "State's-rights" point of view.

Conservation: Agencies and functions

Bennitt, Rudolf. [Restoration; management by public agencies], pp. 190-195.

"Management of wildlife range presents a set of social, economic, and scientific problems much more complex than those involved in the conservation of any of our other natural resources." Favors general public participation in the expense of wildlife restoration. Wildlife management is a form of land use and should receive attention of all State agencies concerned with land use which should work cooperatively on all important projects.

Conservation: Agencies and functions

Biddle, Nicholas. [Restoration; management by public agencies], pp. 181-185.

History of State wildlife conservation in Pennsylvania; the refuge system and its effects; results, to date, obtained largely on forested land need to be paralleled in farming districts; this problem difficult due to non-cooperative attitude on the part of both farmers and sportsmen.

Conservation: Agencies and functions

Clark, Arthur L. [Restoration; management by public agencies], pp. 185-186.

Wildlife management can be carried out only by owners of the land. The function of public agencies is primarily research, demonstration, and education, together with framing laws and policies making private programs possible, and coordinating such activities.

Conservation: Agencies and functions

Cook, Nowell B. [Restoration; management by public agencies], pp. 187-190.

Deer in Utah increased from 12,700 in 1919 to 84,000 in 1935; 65 percent of the hunters are successful. Elk, extirpated, were reintroduced in 1912 and subsequently. From 193 head a herd of about 3,500 has developed. Comment on ownership of land in Utah in relation to wildlife management. Game and range experts make studies and reports as a basis for action by a State game board. "Our game herd has been produced in Utah with dual use of all lands. There is not one foot of land x x x that has been set aside solely for game." "Cooperation is the keynote of our success in Utah x x x in no instance have we had to submit to their [Forest Service's] intention to enforce game removals." Taylor Grazing Act set-up "condemned by the large majority of the population of Utah."

Conservation: Agencies and functions

Hawes, Harry B. [The four vital factors of wildlife conservation], pp. 164-174.

Extemporaneous speech and printed version analyzing the functions and opportunities of the Federal government, the State governments, the farmer, and the sportsman in wildlife restoration and conservation.

Conservation: Antelope

Taylor, Walter P. The prong-horned antelope in the Southwest, pp. 652-655.

Antelope have shown gratifying response to protective measures, but for security adequate winter range must be assured, on a condemnation basis if necessary. The need of refuges is emphasized and suitable areas are suggested.

Conservation: By non-sportsmen

Baker, John H. [Contributions of non-sportsmen to wildlife conservation], pp. 152-155.

Refuges maintained by the National Association of Audubon Societies and the species they protect. Opportunities created by man bring on predator trouble and control therefore should be minimized. Modern research indicates that the traditional view of "vermin" is largely unwarranted. The opinion is expressed that much of the Federal control of predatory animals and rodents "is not only unnecessary but unwise," and the hope expressed that it will be reduced. The hunting license confers a privilege, not a right, and "action consistent with that viewpoint, would greatly minimize friction

between landowners x x x and license-holders." Appropriations from general funds preferable to license fees as a source of conservation support. Importance of conservation education for the youth and the work of the Association in that respect. "The Audubon Association stands for the preservation of an adequate breeding stock of all forms of native wildlife."

Conservation: Grazing interests

Anon. A statement by the National Wool Growers Association with relation to the wildlife question, pp. 222-224.

Importance of grazing industry in western economics; suggestion that the interests of grazing and wildlife be surveyed by an impartial authority.

Conservation: Grizzly bear

Baggley, George F. Status and distribution of the grizzly bear (Ursus horribilis) in the United States, pp. 646-650.

Early history of this bear indicates that it was rather numerous. Like other "big game" of the West it greatly declined in numbers. Authentic figures for the grizzly bear population are all in the period since the decline; they show an increase in numbers of the animals in National Parks and a decrease elsewhere. Net increase from 1924 to 1934, 53 individuals; total in 1934, 1,013 grizzlies. Additional refuge territory probably is needed to assure survival of the species.

Conservation: Interior Department policies

Ickes, Harold L. [The Department of the Interior and conservation], pp. 128-133.

Policies of the National Park Service and Reclamation Service with respect to wildlife. "Of course, we have to have reclamation projects, but I don't see why we can't have a reclamation project which will serve an area properly and at the same time take into consideration the needs of wildlife, making adequate provision for its protection, preservation, and continuation." The national parks system constitutes a real sanctuary for the game, the birds, and the fish of America. "I don't want to see our national parks become Coney Islands." "I wish that we could see a fighting, aggressive conservation movement."

Conservation: International

Phillips, John C. [The work of the American committee for International wildlife protection], pp. 51-56.

Account of the American Committee, and other interested organizations, and of some of their activities and accomplishments. Some immediately pressing problems are the protection of all rhinoceroses, the mountain zebra of South Africa [since given a refuge], certain species of deer, whales, and among fur animals, the chinchilla, certain seals, and the sea otters. The

Tariff Act of 1930 contains a provision for confiscation of products of animals and birds taken in violation of the laws of the countries of their origin. This was strengthened in 1935 and combined with the Lacey Act having a similar relation to interstate commerce in the United States. This legislation has a very important bearing on international wildlife protection.

Conservation: Mexican plans

Zinser, Juan. [The Mexican program], p. 254.

Plans of the Mexican Government as to creation of national parks, game preserves, and zones of refuge for migratory birds. Provisions of treaty affecting non-residents. Intention to regulate pollution.

Conservation: Migratory birds in Canada

Lloyd, Hoyes. [The administration of the wildlife of Canada], pp. 11-15.

Administrative arrangements; history and effect of the Migratory Birds Treaty; law enforcement; sanctuary history, 63 established; the national parks as wildlife refuges; advisory board on wildlife protection, composed, be it noted, entirely of Dominion and Provincial officials concerned with enforcement of the law.

Conservation: National program

Gabrielson, Ira N. [A national program for wildlife restoration], pp. 209-217.

There have been successful national programs in connection with other subjects of general interest and there should be one for wildlife restoration. The Federal Government as a landholder and manager; comparison of the areas devoted to national forests, national parks, and to wildlife reservations. Necessity of cooperation between Federal and State Governments, of closer coordination of activities by Federal agencies, of recognition of wildlife and its interests by land planning agencies, and of interesting private landholders. Wise use of the public domain should include maintenance of wildlife resources. Need for solution of the pollution problem and for adequate research; a categorical statement of the speaker's program was reproduced in WILDLIFE REVIEW, 3, April 1936, pp. 34-35.

Conservation: Taylor Grazing Act

Carpenter, F. R. [Restoration; management by public agencies], pp. 218-221.

Acreage and distribution of lands coming under scope of the Taylor Grazing Act; division into 34 tracts, each about the size of the State of Connecticut. Prior to their establishment, some ten million acres of public

domain were set aside for the primary, but not exclusive, use of wildlife. Suggestion as to a type of State committee that is permitted to name advisers on the governing boards of the grazing districts and thus assist in a program of wildlife protection.

Conservation: Trumpeter swan

Thompson, Ben H. The problem of vanishing species - the trumpeter swan, pp. 639-641.

Status of this species in Yellowstone National Park, Wyo., and at Red Rock Lakes, Wyo., the former area an inviolate refuge and the latter recently acquired by the Federal Government closed to hunting except for a single restricted area. The arrangement seems to work out satisfactorily and it appears that there has been a slow but definite increase in the numbers of this species.

Conservation: Waterfowl

Lloyd, Hoyes. Waterfowl conditions in Canada, 1935, pp. 516-518.

"Generally speaking, waterfowl breeding conditions throughout Canada in 1935 were better than they were during the previous 6 years." Summaries given for the Provinces. The hunting of wild geese which migrate across settled portions of Canada is mostly a thing of the past. The waterfowl breeding area in the southern prairie section of the Canadian west probably never again will regain its importance. Certain other areas remain suitable but their functioning depends on preservation of the breeding stock. "Good breeding conditions on the Canadian breeding grounds will not provide a waterfowl supply for the continent."

Cycles

DeLury, Ralph E., and John L. O'Connor. Regional types of response of wildlife to the sunspot cycle, pp. 490-491.

There are regional differences in response to the sunspot cycle that should be taken into consideration in connection with plans for conservation.

Destruction: Bighorn sheep

Dixon, Joseph S. The status of the Sierra bighorn sheep, pp. 641-643.

Species nearing extermination in the great majority of cases have been reduced to that plight by man - a rule to which the Sierra bighorn is no exception. Hunting (all now illegal), sheep-grazing, and other use of the bighorn's range by man are the cause of the decline. Only a few small bands totalling probably not more than 16 animals are known to remain. It may be possible to save them but it will take strenuous effort. The Forest Service is cooperating by excluding domestic sheep from the known range of the bighorn.

Destruction: Caribou

Swanson, Gustav. The Minnesota caribou herd, pp. 416-419.

These woodland caribou in Red Lake Game Refuge, the only herd in the United States, probably do not number more than 8 individuals. Depredations by poachers and wolves render unfavorable the prospect for preserving the animals.

Destruction: Pollution

Lincoln, Frederick C. The effect of oil pollution on waterfowl, pp. 555-559.

A bird once oiled is doomed. Instances of destruction of wild fowl and other birds in various parts of the country. Efforts to control dumping of oil from vessels in international trade. Nearly half of the shipping of the world is moved through the use of oil. Need of additional legislation to control oil pollution of interior waters.

Destruction: Wildlife

Silcox, F. A. [Opening address], pp. 1-5.

Of most value from the wildlife point of view in calling attention to the abundance of game in pioneer times and to the great reduction in stocks that has been caused by slaughter and usurpation of environment.

Disease: Deer lungworm

O'Roke, Earl C. The lungworm situation in the white-tailed deer (Odocoileus virginianus borealis) in Michigan, pp. 473-478.

Kinds of lungworms found, seasonal occurrence, life history, pathogenicity. Suggestions for control include, prevention of over-populations of deer, proper distribution of watering facilities in summer, and provision of sufficient food in winter.

Disease: Duck gizzard worm

Swales, W. E. Tetrameres crami Swales, 1933, an important parasite of ducks in North America, pp. 491-493.

This nematode, identified from several species of wild ducks, infests the proventriculus and causes, besides pathogenic changes there, disturbances in protein digestion. The alternate hosts are amphipods.

Disease: Eelgrass

Lewis, Harrison F., and Clarence Cottam. Eelgrass and other waterfowl foods - present status and future prospects, pp. 498-501.

Despite the annual appearance of fresh growth of eelgrass, most of this succumbs to the malady that has prevailed for several years. There has been no permanent amelioration in the condition of the plant on the Canadian coast but in the Chesapeake Bay region genuine improvement is manifest. Wigeongrass is in part replacing eelgrass and restoring ecological associations formerly dependent on the Zostera. Experiments are being made in the transplanting of resistant and introduced strains. Brant, the birds most seriously affected by decline of the eelgrass, show little if any recovery in numbers.

Disease: Lead poisoning

Green, R. G., and R. L. Dowdell. The prevention of lead poisoning in waterfowl by the use of disintegrable lead shot, pp. 486-490.

Combination of a small amount of magnesium with lead produces an alloy which will disintegrate in the presence of water, and is therefore eliminated rather promptly from the alimentary canal of ducks. Discussion of the practicability of commercial manufacture of shot having the desired characteristics.

Disease: Quail

Morley, L. C., and P. W. Wetmore. Discovery of the organism of ulcerative enteritis, pp. 471-473.

History of investigations of "quail disease", and of the authors' work resulting in identification of the causal organism as a bacterium (Corynebacterium perdicium n. sp.), criteria for the recognition of which are given.

Disease: Sanitation

Costigan, S. M. Sanitation on the game farm, pp. 380-384.

Game birds for restocking are not only of lessened value if diseased or parasitized but are a menace to the wild population. They should be raised and released as nearly disease-free as possible. Classification of diseases according to their causative agents and of remedial measures with respect to their effectiveness against these agents. Sodium hypochlorite the most satisfactory disinfectant for pens and for water. Yards, not being readily disinfected, should be rotated. Remarks on disease preventive measures.

Disease: Snowshoe hare, etc.

Green, R. G., and J. E. Shillinger. Progress report of wildlife disease studies for 1935, pp. 469-471.

The peak population of the snowshoe hare in the Lake Alexander area, Minn., was reached in 1933. Spring censuses gave 478 hares to the square mile in that year, 374 in 1934, and 220 in 1935. Tularemia is not a major factor in the die-off of the snowshoe hare. Figures are given on tick infestation and on the extent to which ticks harbored tularemia. Fowl cholera and a filterable virus disease identified in ruffed grouse. Notes on disease among captive red foxes, pheasants, and Canada geese, and among wild gray foxes, raccoons, and rabbits.

Ecology: Carrying capacity for duck nests

Bennett, Logan J. Duck nesting carrying capacities in Iowa, pp. 494-498, 1 table.

The heaviest concentration of nests found was one to an acre (21 on an equal number of acres) where the cover was chiefly cord grass. Ninety-five percent of the nests of shoal-water ducks were found within 220 yards of the shoreline. A relationship between length of shoreline and usable nesting cover therefore is evident. From studies in Alberta as well as in Iowa, it was found that areas surrounding potholes of about half an acre in extent presented optimum nesting conditions. Bibliography of 8 titles.

Ecology: Duck counting

Lincoln, Frederick C. Waterfowl populations, pp. 509-516.

On account of the migratory habits of the birds, adequate studies of the waterfowl population can be made only on a continental basis. Censuses or accurate counts are impossible but estimates having practical value can be made. Description of methods used in a survey that indicated there were about 17,000,000 wild ducks in the United States in January 1935. Correlated work showed about 10,000,000 present in Mexico and Central America. Estimating 6 million legally killed, 6 million illegally bagged or destroyed by other causes in the United States, and 5 million lost due to like causes in Canada and Mexico, an estimate of 44,000,000 game waterfowl prior to the shooting season is reached. The estimated loss of 17,000,000 or 40 percent is considered too much of a drain upon the stock and regulations should be framed to reduce it. Description of breeding season surveys including those of 5 field parties in Canada, with some notes on the results. The method of counting flocks of waterfowl on the water is to estimate the square yards covered by the flock, allow one bird for each square yard, and subtract one-third to compensate for open spaces and irregular configuration of the raft.

Ecology: Mosquito control operations

Bourn, W. S. Mosquito control and waterfowl, pp. 505-508.

Control of mosquitos to assure human comfort and health is approved but drainage projects apparently not in the public interest are opposed. Studies, both direct and experimental, of the ecological effect of drainage are under way. Location and character of the investigational work and extent of cooperation are stated.

Ecology: Overpopulation of moose

Hickie, Paul F. Isle Royale moose studies, pp. 396-398.

Moose, first reported about 1914, steadily increased in numbers until it was evident that in the absence of predators or other checks there would be an overpopulation. Shortage of food ensued, was aggravated by devastation of balsam fir by the spruce budworm, and the herd has been rapidly declining from about 1933. Field studies and autopsies in 1934 showed clearly that malnutrition was the cause of the decimation of the herd. Some of the animals were removed for stocking elsewhere and more will be. Experiments with captive moose showed a daily requirement of about 25 pounds of mixed balsam and birch browse.

Economic Values

Rosengren, Roswell P. [Why concern ourselves about wildlife? Economic importance discussed], pp. 29-35.

Emphasis on economic values; statement of the evils of deforestation, drainage, pollution, overgrazing, and persecution of wildlife. "The power, importance, and wealth of the United States has been built on a ruthless robbing of nature's bounty." Necessity of conservation and wise use to the prosperity of the country.

Education

Smith, C. B. [Extension Service and 4-H clubs in relation to conservation], pp. 139-142.

Sketch of the work done, with concrete examples, especially for Minnesota and Nebraska. "We look upon the work by rural youth in the various phases of x x x [nature] as contributing about as much to the abundant life as any one thing we can do in extension."

Education

Studebaker, John W. [Conservation in the schools], pp. 134-139.

A plan for promoting the teaching of conservation in the schools of the nation.

Farmer-sportsman relationship

Bennett, Logan J. Iowa, pp. 290-293.

Dry lake beds leased to sportsmen's organizations for nominal fees and with game management plans furnished by the State showed several hundred percent increase in pheasants the first year. [Perhaps largely inflow.] After 16 years of closed seasons on quail, shooting was resumed only with the cooperation of groups favorable to complete protection. Shooting had to be closely regulated, therefore, and this required considerable effort and expense. Trial of game management was made on 130 areas varying from 640 to 17,000 acres in size. Defects in operation are pointed out and a revised plan is set forth.

Farmer-sportsman relationship

Chalk, John D. North Carolina, pp. 288-290.

Plans.

Farmer-sportsman relationship

Leopold, Aldo. North Central Region, pp. 279—285.

Of 350 farmer-sportsman areas developed in the region since 1931, most apparently survive at least on paper. "There are six types of organization x x x and three choices of legal status, hence 18 types of set-up are possible." A few of these are discussed. Of the strictly commercial type - leased shooting - the farmer doing nothing, and management, if any, being done by the lessor or agent; about 65 have sprung up in Wisconsin of which 59 survive. From the standpoint of public policy they seem more objectionable than otherwise, and after experience, similar arrangements were denied legal authorization in Michigan. An example is given of a small-scale farmer-sportsman cooperative, the farmer contributing land and feed, the sportsman cash, and both parties sharing very moderate shooting. Extension of this type seems desirable. Notes on Iowa farmer pools, but on this topic see Bennett. "Whether Iowa succeeds or fails, it takes courage to attack this difficult problem of how to make the transition from the old system, which is bankrupt, to some new system x x x as yet only dimly defined." Two of three farmer-sportsman associations failed because of quarrelling; the other, restricted to simple management of cottontails, has been an astonishing success. Farmer pools on a fee basis have failed but new plans are being tried. No standardized scheme seems likely to succeed when so much depends on the personality and interests of the landholder. Absentee management is poor at best. Comment on the difficulties of teaching cooperative game management and of administering schemes for promoting it. Bibliography of 6 titles. A tabulation shows classes and legal status of organizations for farmer-sportsman cooperation in the North Central States.

Farmer-sportsman relationship

MacNamara, L. G. New Jersey, pp. 275-278.

Under the plan fostered by the State Fish and Game Commission, one-fifth of a cooperating farmer's land is posted and maintained as a refuge by the Commission. [As this land is immediately adjacent to the farm buildings and pastures, it is evidently a refuge for the farmer, his family, and his stock, rather than for wildlife.] The remainder of the farm is open to hunting, but the farmer may restrict the number of hunters to one to each 20 acres; the hunters must register. The area is stocked by the Commission, advice given on game management, and seed furnished for feed patches. In three years (1933-5) the acreage of lands under contract increased from 52,500 to 127,759. Sportsmen's clubs, to which farmers may belong, with Commission cooperation also, make less restricted arrangements with farmers. On these lands a thorough winter feeding program has been carried out. The State further has public shooting grounds which serve as game management demonstration areas.

Farmer-sportsman relationship

O'Connell, Frank B. Nebraska, pp. 286-288.

Steady decrease in game birds demands consideration of plans formerly held too commercial. The Nebraska "Hunters Shooting Scrip Act" did not work possibly because of being tried at a time when farmers were not anxious to increase their revenue. A new and more thorough trial planned. Everything possible should be done to build up a friendly relation between the sportsman and the farmer. Contribution by sportsmen of grains for winter feeding of wildlife is a successful means to this end.

Farmer-sportsman relationship

Ruhl, H. D. Coordination of farm-game management with the usual farm-game practices, pp. 603-606. Printed also in American Wildlife (American Wildlife Institute, Investment Bldg., Washington, D. C., 25 cents a copy), 25(3), May-June 1936, pp. 35, 42-44, 6 photos.

Game management on farms must fit in with agricultural practice and contribute to making farming more profitable. The techniques must be developed by interests definitely friendly to the farmer, and tested at a new type of wildlife experiment station. While certain practices bad from the farming standpoint have actually been put into effect, others have been tried that are beneficial both to the farm and to wildlife. It is such methods that must be worked out by experiment and test so that the results of adopting them will be fairly predictable. Suppose successful methods are developed and applied, will the market and the price hold up? What about the competition of free hunting? An original and thoughtful treatment of the vexed farmer-sportsman relationship. Bibliography of 3 titles.

Farmer-sportsman relationship

Schoenfeld, Wm. A. Wildlife as an agricultural resource, pp. 608-613.

Wildlife management and agriculture are by nature inseparable, and the problem is to conduct the two in harmony and to their mutual benefit. Wildlife management should be approached in the same spirit and by similar methods as are other phases of agriculture. "In making effective any program for adding wildlife production to our other agricultural enterprises, several definite steps," said the speaker, "it seems to me, are essential. First, there must be created favorable public sentiment, both among farmers themselves and on the part of the general public. To do this will require considerable change in the thinking regarding many formerly accepted practices, both by farmers and sportsmen. Another step will be the training of a sufficient group of men who can be used throughout the country in giving specialized guidance to rural and urban people in their handling of the wildlife problems. The third step, which must be taken coordinately with the other two, is the carrying on of a strong research program to add to the present knowledge of wildlife management. This will include, among other elements, study of the food habits, methods of propagation and distribution of wildlife, and methods of disease prevention and control."

In the West, the interests of livestock and big game must be coordinated and experience proves it can be done. So far as farm game is concerned the way must be prepared by research, demonstration, and other educational methods. The need of additional farm income is pressing and wildlife management should help to solve that problem. Oregon is trying a scrip plan under which the farmer receives 45 (and the State game commission five) cents for each pheasant bagged. The establishment of a Cooperative Wildlife Management and Demonstration Project at Oregon State College has revealed a demand far greater than was anticipated for training in wildlife management. Suggestion of subjects for research.

Farmer-sportsman relationship

Taber, L. J. [The National Grange and game restoration], pp. 160-163.

Stresses the necessity of financial rewards to farmers who, as a class, believe in conservation but who may find economic pressure so keen that it is impossible for them to do what they should like to do. The farmer feeds game every day in the year and if we hope to make any progress, we must recognize his rights. Extending fair treatment, we can depend upon the farmer as the bulwark of the program of wildlife restoration and conservation.

Food Habits: Deer dietary requirements

Nichol, A. A. The experimental feeding of deer, pp. 403-410.

Forage requirements for livestock are quite definitely known from experimental studies; to aid good management, similar information should be made available relative to wildlife. The species used in the study were the Rocky Mountain mule deer and the Arizona whitetail. Equipment and routine of the experiment described. To obtain a basic subsistence ration, studies were made with alfalfa hay for roughage, and oats, corn, and barley for concentrate. The maintenance ration was found to be 2.2 lbs. to each hundred pounds of the deer's weight; 2.3 lbs. were given to does during pregnancy. Experiments with mixed native foods showed that about the same quantities were sufficient. The results as to palatability differ from some that have been published on the basis of field studies. Grasses were found of more importance than is usually recognized. Some of the more palatable foods are live oak, mulberry, hackberry, aspen, wild buckwheat (Eriogonum), Fendlera, mountain mahogany, mistletoe, wild grape, and legumes. Various miscellaneous findings from the experiment also are reported.

Food Habits: Nutritive values of winter foods

Errington, Paul L. Differences in nutritive values of winter game foods, pp. 356-360.

Even if natural preferences of wildlife may be a good guide to food selection, under critical conditions there may not be opportunity to get the most desirable types of food. Winter may be a period of food crisis and an important part of management may consist in assuring an adequate food supply. Corn appears to be a highly satisfactory winter food for quail and pheasants. Others of considerable value include soybeans, sorghum, most cultivated grains, acorns, akenes of ragweed, seeds of pigeon grass, beggarweed, hog peanut, and jewelweed. Under experimental conditions, seeds of sweetclover and butterprint have a mildly toxic effect, and fruits such as those of sumac, wild grape, rose, and coralberry did not suffice to prevent loss in weight of the captive birds. In few localities in the North-central States are there more than 2 or 3 kinds of staple winter foods in quantity sufficient to supply the needs of moderate populations of pheasants and quail, and emphasis should be placed on keeping the environment well supplied with foods of substantial nutritive value rather than of the succulent or "salad" types. Bibliography of 6 titles.

Game: Of Mexico

Zinser, Juan. [The Mexican wildlife situation], pp. 6-11.

Comment on the principal game species, both mammals and birds, giving scientific, Mexican, and American names, and indicating the extent to which they are hunted, their numerical status, and existing and proposed protective measures.

Life Histories: Bobwhite population fluctuations

Kennedy, I. N. Fluctuations in the population of bobwhite quail in the South, pp. 481-486.

Largely due to meteorological conditions. The same paper abstracted from another source in WILDLIFE REVIEW, 4, June 1936, p. 9. It has also been published in Maryland Conservationist (512 Munsey Bldg., Baltimore, Md.), 13(3), Summer Issue 1936, pp. 1-3.

Life Histories: Cottontail rabbit reproduction

Trippensee, R. E. The reproductive function in the cottontail rabbit (Sylvilagus floridanus mearnsii Allen) in southern Michigan, pp. 344-350, 2 tables.

The importance of the cottontail as a game species emphasizes the need for thorough information as to its life history. Description of primary and secondary sexual characters. Data on sex ratio conflicting but the numbers of the sexes seem to be about equal. Sexual maturity of females attained about the fortieth week, so breeding does not occur the first season. In southern Michigan two litters per year are common and even four are possible. The number of young per litter averages 5.04. Parturition nests and their location described. The young are born blind and helpless but grow rapidly and at 2 weeks of age eat grass and move out from the nest for limited distances. The young are well cared for and defended. The breeding season extends from January to August. Bibliography of 10 titles.

Management: Burning

Stoddard, H. L. Relation of burning to timber and wildlife, pp. 399-403.

Light surface fires may be used, under proper supervision, with benefit both to the forest and wildlife. In fact properly used fire may be considered the most important tool of the game manager in the Southeast. Under a policy of fire exclusion, legumes of primary food value to quail, wild turkey, and other wildlife are gradually suppressed, cover becomes undesirably dense, and parasites multiply. Fire prepares the way for a good catch of pine seedlings; these should then be protected from fire for at least a year; after that light burning at intervals of from 1 to 3 years is beneficial. Fire should be excluded from swampy low woods and from the upland "hammock" type. February and March are the best season for burning operations. Technique of light burning described.

Management: Duck breeding grounds

Huntington, John C. The wild-duck factory needs repairs, pp. 518-523, 1 pl.

Seventy percent of the prairie type of breeding territory lies in Canada. The remainder in the United States has virtually lost its importance and, despite development of refuges, there is doubt that it will ever again supply a sizable percentage of the continental duck crop. "It is the breeding grounds of Canada that hold the key to the future of ducks." Good management of the northern section of the Canadian breeding area and restoration and management of parts of the southern area, not particularly valuable for agriculture, are urged. Suggestions are given as to lines of improvement, cost, and who should bear the cost. "It is squarely up to the duck shooters of the United States x x x to take the initiative and to decide promptly whether or not this necessary job should be thoroughly done, now before it is too late."

Management: Environmental improvement

Bump, Gardiner. From scrub oak and pitch pine to quail, pp. 599-603, 1 table.

3,700 acres of the Camp Upton area on Long Island were devoted to experimental wildlife management; 49.6 miles of food strips and 19.8 miles of a combination feed strip and fire line were cleared and planted. Reforestation was undertaken but islands of native cover were preserved. Watering facilities were doubled and a moderate degree of predator control was exercised. Some restocking was done, but aside from that a considerable increase in the game bird population is believed to have been achieved in the single year the project has been under way.

Special experimental feed patches were installed and the characteristics of the plants in them are tabulated so as to show their value to wildlife, especially in retaining seed through the winter, and in remaining upright regardless of snowfall. On the basis of this single year's work, the following food plants are regarded as best for the region at the seasons indicated: For late spring and summer - (1) winter rye; for fall - (1) Tartary buckwheat, (2) Japanese millet, (3) proso; for winter - (1) golden millet, (2) Tartary buckwheat, (3) early amber sorghum, (4) spring rye. Some cost figures are given.

Management: Environmental improvement

Hosley, N. W. Permanent food and cover for wildlife in the Northeastern United States, pp. 576-582, 2 tables. Printed also in American Wildlife (American Wildlife Institute, Investment Bldg., Washington, D. C., 25 cents a copy), 25(3), May-June 1936, pp. 36, 44-46, 4 photos, 2 tables.

In addition to general discussion, this paper includes a valuable table showing the chemical composition of 11 kinds of wild fruit, 7 of mast species, and of corn and grasshoppers for comparison. There is presented in tabular form also a summary of records as to utilization by song birds, and

by 6 species of avian, and 5 of mammalian, game, of 44 groups of plant food producers. Variable comment on bearing season, habitat, and germination requirements of some of the plant groups. Bibliography of 10 titles.

Management: Forests for deer

Clepper, Henry E. Forest-carrying capacity and food problems of deer, pp. 410-415.

Silvicultural practices have been directed greatly toward timber, little toward game, production. Some foresters prefer a minimum deer population because deer are an obstacle to reforestation. Regulation, not elimination, of deer, however, would seem the best policy. In the Northeastern States, forests carry populations as high as one deer to each 15 to 25 acres, but at that figure they are overpopulated. In some years hundreds of deer have died of starvation in Pennsylvania. Specific information on carrying capacity is greatly needed and experiments under way are designed to supply it. Tree growth suppresses the shrubby vegetation that is of most value to deer. Selective cutting can correct this condition and its effects may persist for at least 5 or 6 years. Orderly improvement cutting will increase carrying capacity of forests and improve the condition of the deer. Such work has been started on Pennsylvania state forests.

Management: Forests for wildlife

McAtee, W. L. Forest management and wildlife management, pp. 419-423.

For maximum production of timber on the one hand, and of wildlife on the other, the requirements as to manipulation of the vegetative cover are almost entirely opposed. Recognition of this fact should clarify considerations of policy and help foresters and wildlife managers in deciding what treatment to give various areas. Stand improvement operations may be inimical to wildlife, and encouragement of the closed canopy certainly is. Burns and clearings soon become, and for some time remain, improved habitat for wildlife. Foresters are justified in practicing pure forestry in their domain but on lands where wildlife production is a primary objective, wildlife managers should forget forestry and adopt any and all policies necessary for the highest welfare of wildlife. Bibliography of 5 titles.

Management: Fur resources

Bonnycastle, R. H. G. Hudson's Bay Co. and fur conservation, pp. 625-628.

In existence since 1670, the Company really governed a large part of Canada until comparatively recent times. Controlling half of the total crop of raw furs of Canada, the Hudson's Bay Company is vitally interested in maintaining the stock. Conservation is necessary also to prevent the Indians and Eskimos from becoming public wards. The Company is interested

in fur farming and is developing it as rapidly as possible, consistent with quality of product. Beaver were the basis of much of the fur countries' prosperity and with their decline the human population suffered. As a step to restore these animals, a 7,000 square mile tract was leased from the Province of Quebec and made a beaver sanctuary, Indians being employed as guardians. The increase in the animals has been steady: 1933, total 162; 1934, 368; and 1935, 600. It is thought that this project will result in the restoration of beaver trapping and in consequence of the prosperity of the region. The success of this initial undertaking has inspired the establishment of similar refuge units in other areas.

Management: Fur resources

Cameron, T. The conservation of fur in the Northwest Territories of Canada, pp. 621-625.

Over an area of more than 1,300,000 square miles, wildlife and particularly fur animals are now, as they ever have been, the basis of livelihood for the sparse population. Mining developments have brought in many new people in recent years but this new situation has promptly been met by Dominion officials responsible for wildlife protection. Vast reserves have been set aside and hunting and trapping regulations carefully revised. Location, area, and general character of the principal refuges are set forth. The value of the fur yield of the Northwest Territories for 1933-4 was $1,515,017. A table shows the number of skins of the leading species marketed.

Management: Fur resources

Genfan, Irving M. [Platform of the American Trappers' Association], pp. 632-637.

The trapper-farmer is the foundation of the American fur industry. The platform is as follows; some of the sections are commented upon in the full text of the address.

"1. Protect and propagate beneficial wildlife.

"2. Eliminate unnecessary cruelty in trapping.

"3. Strenuous opposition to the use of poison baits to kill fur-bearers.

"4. Protect beneficial wildlife from unfair methods - smoking, den digging, tree cutting, and so forth.

"5. Restock as much as possible all lands where desirable species are extinct; introduce new species where needed.

"6. Demand laws in compliance with necessity - protective to wildlife and of benefit to the fur industry in general.

"7. Protect trappers from dishonest fur houses and educate trappers to the proper methods of handling furs to enhance their value.

"8. Protect the American market from imported furs, the same as other industry; educate the American public to the superiority of American furs; insist upon all furs being sold under true name.

"9. Protect our forests from fires or other forms of destruction; encourage reforestation; protect our streams from undue pollution or commercialization; discourage drainage or reclamation of such lands as will be of more value as a refuge of fur and game.

"10. Eternal vigilance and protection of the trapping and fur industry from any organization, or combination of organizations, whose purpose is based upon fanaticism or greed, or whose ideals are not in keeping with the rules of true sportsmanship, or, whose intentions are detrimental to the interests of the trapping and fur industry."

Management: Fur resources

King, C. E. [Fur situation in Louisiana], pp. 630-632.

The fur catch in Louisiana has greatly declined; formerly employing 25,000 trappers it now gives occupation to only 5,000. Research is required to develop a basis for recovery.

Management: Fur resources

Lloyd, Hayes. Canada's fur resources, pp. 628-630.

Relation of the fur trade to the development of Canada. The benefits of good management proved by history of the Pribilof fur seal herd. Growth of fur farming; it is estimated that a third of the total value of Canadian furs is derived from animals bred on farms. The value of Dominion furs in 1933-4 was $12,349,328; the principal items are annotated.

Management: Fur resources

Mills, David C, Acting Chairman. [An American fur policy], pp. 637-638.

The first ten articles in the policy as amended and adopted by the sectional conference are:

"1. That the economic and social value of fur animals as a natural resource be more generally and specifically recognized by State and Federal Governments and that it should receive financial support for development from State and Federal Governments commensurate with its importance.

"2. Inasmuch as basic statistical data essential to intelligent fur-resource management is and has been heretofore impossible of attainment, we recommend that the State and Federal Governments shall cooperate in a survey of the latent as well as visible supply of fur animals and we also suggest as the first step toward this end:

(1) The States shall inaugurate a reliable system of recording the annual catch of fur animals.

(2) All fur shipments in interstate trade shall be reported as to number and kind by the shipper to the Federal Government and checked by a similar report to the Federal Government by the receiver.

"3. It is recommended to the States that their trapping laws be amended to segregate trapping from hunting and fishing by the issuance of trapping licenses to adult trappers at a reasonable fee and trapping permits to youths without charge, the object being to obtain statistical data on the annual catch of fur animals and to make it possible for the States to disseminate information to make trapping more profitable.

"4. It is our conviction that the Federal Government has too long neglected and ignored the economic value of fur resources in the administration of public lands and we, therefore, urge that surveys be made by appropriate governmental agencies of areas in the public domain adaptable as, or affording, suitable habitats for fur animals, and, further, that such areas insofar as practicable be devoted to developing and maintaining this natural resource.

"5. That in particular no reclamation, irrigation, or drainage projects shall be undertaken without the approval of the Biological Survey after this organization has determined the effect of such projects upon the natural supply of fur animals on the land under consideration.

"6. Regardless of the laws in respect of the title to wildlife throughout the public domain it is our opinion that the physical act of trapping on the public domain is and should be within the judgment of the Federal Government as it is of private land owners, and that the control of trapping on the public domain is within the jurisdiction of the Federal Government.

"7. While approving of the reduction of the use of poison by the Government in predatory-animal control, we believe that this reduction has not gone far enough and that other methods less questionable from the standpoint of conservation should be attempted. We further recommend that predatory-animal control be strictly limited to areas in which depredations are of severe consequence.

"8. It is our belief that, generally speaking, open seasons for trapping fur animals are too long and that with due allowance for exceptions rendered necessary by local conditions an open season of not more than 2 months in the prime-fur season of any year is sufficient and all that this wildlife resource can stand. We recommend that the States be encouraged to act on this recommendation.

"9. We recommend a closed season of at least 5 years' duration throughout the entire country on fisher, wolverine, and marten. All of these are extremely valuable and are on the verge of extinction in the United States.

"10. We deprecate the criminal and short-sighted activities of dealers in illicit furs, especially beaver, and suggest an aggressive policy on the part of the Government with which the raw-fur trade at large will cheerfully cooperate."

Management: Indian Reservations

MacInnes, T. R. L. [What Canada is doing for the hunting Indians], extemporaneous remarks, pp. 229-232, formal paper, pp. 232-236.

Canadian problems similar to those in the United States (see below); Indian home reservations much smaller, but very extensive hunting areas have been set aside for their exclusive use. Formerly Indian families parcelled out hunting and trapping territories which were recognized among themselves and handed down from one generation to another. On each of these areas several trap lines were established, only one of which was trapped during a given season or series of seasons, giving in effect a system of rotation similar in principle to that used in agricultural cropping. A modern system of trapping certain areas under permit is modelled on this Indian practice.

Management: Indian Reservations

Marshall, Robert. [Wildlife management on Indian Reservations], pp. 224-228.

Indians, prior to contact with white men, were generally prudent in utilizing wildlife. The bad example of the white man, and necessity, combined to turn the Indians into exploiters. There are no legal means of restricting hunting by Indians on their reservations and the approach to better conservation must be by restoration of economic stability of the Indians who, then not driven by necessity, will doubtless seriously consider reasonable restrictions on hunting, trapping, and fishing.

Management: Land planning

Leopold, Aldo. [Restoration; management by private agencies], pp. 156-158.

Game management must be applied to all available areas to produce a supply equal to the demand. Conclusions: "1. The present program is lop-sided. The inherent properties of wildlife and land use call for moderate stands on large areas, rather than heavy stands on small areas. Management on large areas means management on private lands; 2. Some misplaced private ownerships must be extinguished to save rare species. The grizzly is an example; 3. There is need for a new mechanism to reward private conservation of small waterfowl breeding areas and other spots which the public cannot buy, which must be managed, but which should not be shot; 4. There are inherent limits of speed and size in the building of public conservation agencies."

Management: Marking ruffed grouse

King, Ralph T. [Methods of marking ruffed grouse. Part of a discussion], pp. 369-370.

Dyed feathers cemented on plumage of adults; engraved surgeon's clip on young before large enough for banding. Less than 10 percent returns on juvenile birds.

Management: National Forests

Silcox, F. A. Wildlife management on the National Forests, pp. 255-259.

"In the West as a whole, almost 75 percent of the remaining big-game ranges are now within national forests." Despite joint use with livestock summer forage is in most areas adequate. Winter range, however, is deficient, and animals which can live on the national forests for 9 to 10 months of the year are in winter forced outside. The territory they frequent at that time, some 20,000,000 acres, should be added to the national forest system. Refuges alone may prove unsatisfactory and wildlife management on a broad basis is needed. Organization of a Division of Wildlife Management in the Forest Service announced. Plans call for a wildlife specialist in each of 6 forest regions, and for one in each of 100 forests important for wildlife. A mobile force of some 200 men to supplement existing law enforcement personnel also is contemplated. Plans include cooperation with the Biological Survey in game surveys and the establishment of Biological Survey research stations. "All national-forest resources are perpetuated through use in the interests of the greatest number of people in the long run. Wildlife is one of those resources."

Management: National Parks

Wright, George M. [Restoration; management by public agencies], pp. 236-239.

Protection on the national parks alone cannot absolutely safeguard wildlife because it may be affected by conditions on adjacent areas. "Unless there can be a national program of wildlife restoration and conservation, then eventually the parks and sanctuaries will become drained of their wildlife and will become part of the growing biological desert of America." The parks regarded as laboratories preserve natural conditions the wildlife manager should know when he seeks to restore natural habitats. An important function of the parks is the perpetuation of representative examples of the principal biotic associations of the United States.

Management: Refuges

Kubichek, W. F. The C. C. C. rehabilitates waterfowl habitat, pp. 615-618.

The construction and usefulness of dams, dikes, and islands are briefly noted. Fuller information is given about the collection and storing of seeds and other parts of plants to be used in improving food and cover on the Federal migratory bird refuges. A table is given showing the number of tons of such material collected.

Management: Refuges

Salyer, J. C. Practical waterfowl management, pp. 584-598.

In 19 months, 45 new refuges totalling over one and a half million acres were established. The three principal types involved are, (1) The great nesting marsh restorations of the North and Northwest, (2) The intermediate nesting and feeding migratory refuges along the four great flyways of the continent, and (3) The large-scale wintering refuges in the southern part of the country, extending from the mouth of the Delaware to the Sacramento Valley in California. There is discussion by regions of refuge needs and how they are being met, with special comment on one or more refuges in each region illustrating sectional variations in refuge acquisition, qualifications, improvement, and management. The principles underlying the Federal migratory waterfowl refuge program are categorically stated and suggestions made as to cooperation by the States.

Management: Regulating kill

Cunningham, A. G. Wild waterfowl conditions in Manitoba, pp. 525-526.

Geese are hardly molested in the Province but each year about 135,000 ducks are killed. Drought and other drawbacks have greatly reduced wild fowl production. Hunting must be decreased and Manitoba has steadily increased its restrictions on the kill.

Management: Regulating kill

Taverner, P. A. The fundamentals of the duck situation, 1936, pp. 523-525.

Ducks have been steadily decreasing ever since the white man came to the country. There are many contributing causes but all boil down to this - that mortality has been greater than reproduction. It has been said that human restriction has been tried and failed. The truth is that adequate restriction has never been fairly tried. The only surety for the permanency of duck shooting seems to lie in the limitation of the number of guns in the field.

Management: Restocking

Wessell, Charles W. Releasing larger pheasants, pp. 384-385.

Release at 6-7 weeks not proving very satisfactory, restocking with fully grown birds in spring is planned.

Management: Ruffed grouse

Miller, J. Paul. A report on the Pillsbury, New Hampshire, game management project, pp. 360-365.

Description of the area, the lines of investigation proposed, methods of recording data by the use of few base, but many translucent, outline maps. Studies of ruffed grouse indicate limited range for individuals, loss of about 31 percent of the birds to predators in 6 months, and 50 percent of nests destroyed or abandoned. Effects of silvicultural work by foresters show little indication of benefitting wildlife. Experimental work included especially "release" of apple trees, provision of escape runs in masses of cover, and the making of openings in the forest. Feed patches without special treatment of soil were failures. Seasonal availability of wild fruits was recorded and in general found rather short. Studies of conditions in relation to aquatic plants and fur animals are in progress.

Management: Sandhill crane

Henika, Franklin S. Sandhill cranes in Wisconsin and other Lake States, pp. 644-645.

Ecological requirements of the species; notes on existing colonies in the region reported on; three of the areas have recently come under partial administrative control of the Federal Government. Preservation of suitable environment, strict protection, and management are necessary to perpetuating this magnificent species in the Lake States.

Management: Soil Conservation Service

Holt, Ernest G. Soil conservation means wildlife conservation, pp. 239-243.

Contrast of conditions before and after settlement by white men. As a result of soil exploitation a hundred million acres of good farm land have been essentially destroyed for crop use by erosion, a like area has been severely impoverished, and a third aggregate of the same order is now being rapidly eroded. Soil and wildlife go downhill together and must be brought back together. Aims of the Soil Conservation Service and of the Section of Wildlife Management. The methods are such that "the wildlife specialist could not ask a better opportunity for the application of his science." Revegetation is the keynote, and it affords a chance to renew the conditions most favorable for wildlife existence. The program is carried on through demonstrations lasting 5 years, the hope being that the farmer will become interested in continuing wildlife management and that he will be encouraged to do so by a proper attitude on the part of the public, especially the sportsmen.

Management: Stocking

Bonnycastle, R. H. G. Canada's reindeer experiment, pp. 424-427.

Account of driving a herd of reindeer from the west coast of Alaska, 1,600 miles along the Arctic rim of the continent, to a 6,000 square mile reserve near Kittigazuit, east of the Mackenzie Delta. The drive began December 1929 and was concluded March 1935. The herd contained 3,440 reindeer at the start and 2,370 at the finish. Fawning in the spring of 1935 again brought the number of the herd to more than 3,000. History of the drive and of the preliminary investigations, both of which were carried out in a very systematic and thorough way.

Management: War Department Reservations

Hobson, Wm. H. [Restoration; management by public agencies], pp. 244-250.

Lt. Col. Hobson reported that there are 375 War Department reservations totalling about one and a half million acres. On many of these game management is being practiced and the results in illustrative examples are cited. Work of the Army Engineers that affects wildlife is conducted in cooperation with the proper Federal bureaus.

Management: Waterfowl

Pirnie, M. D. Michigan waterfowl management studies, pp. 501-504, 1 table.

Returns from the banding of nearly ten thousand wild ducks indicate an annual kill of close to half of the stock. Shorter open seasons lessen the kill and increase the next years' breeding stock. There has been no shortage of wild fowl food in Michigan; muskrats appear to be more, but carp less, destructive than reported elsewhere. Thus far artificial stocking has not proved effective as a restoration measure. Notes are given on diseases, parasites, and predators. "Michigan observations fail to indicate serious losses of healthy, uncrippled waterfowl by predators, except in the case of incubating birds."

Management: Wild turkey

Stoddard, H. L. Management of wild turkey, pp. 352-356.

Desirability of preserving genuine wild stock. Restocked areas should be in part absolute sanctuaries which, at least, in the early stages of a restoration program should be of 20,000 to 100,000 acres in extent. Competition by open range livestock is a serious obstacle to success with turkeys and must be controlled. Plantings for turkeys must be fenced to exclude all forms of livestock or, better, confine the latter animals to fenced ranges.

Controlled use of fire aids in maintenance of proper food and cover conditions and in the control of parasites. Trees and shrubs producing food for turkeys should be spared in stand improvement operations. Openings for feed patches and to produce insect food are required. Freedom from disturbance is important and a degree of control of natural enemies is desirable.

Propagation: Bobwhite

Poyner, M. O. Modern methods of quail breeding, pp. 373-376.

To gain economy and efficiency, great changes have recently been made in quail rearing methods. The old and the new systems are contrasted under these headings: Methods of handling laying stock, brooding, and feeding. Small wire-bottom pens usable at all seasons have reduced the cost of quail production because of smaller amount of material, and reduced space and labor, required; and what is more important, have lowered mortality from disease. The Coleman brooder not proving very satisfactory in the North, the MacNamara colony house was developed; its construction and brooder elements are described. Use of the colony house reduces labor, equipment, and heating costs, and yields more uniformly developed birds. Feeding has been much simplified. Production has been increased.

Propagation: Game bird standards

Pirnie, Miles D. Game bird standards of perfection, pp. 378-380.

Notes variation due to age, sex, season, and subspecific status and consequent difficulty of setting standards. Suggests captive-rearing of sample flocks from wild eggs.

Propagation: Pheasant

Smith, E. C. Pennsylvania system of artificial brooding of ring-necked pheasants, pp. 376-378.

Adoption of an electric incubating and brooding system. Notes on the brooding equipment and its use; feeding; and cure of picking vices. Percentage of birds raised after consignment to brooders has improved and was 93.3 in 1935.

Propagation: Waterfowl

Grange, Wallace. Seminatural game farms for wild waterfowl, pp. 371-373.

The plan described, much like a well developed system of handling partridges and pheasants, gains its main advantage from the possibility of getting one or more clutches of eggs from the breeding stock besides the set they are allowed to incubate. It requires ample natural environment,

complete control of the land, adequate breeding stock, facilities for hatching surplus eggs and caring for the young, and for holding and properly attending to the birds the year round. By this system hardy stock trained to forage for itself can be produced. In Wisconsin great horned owls, crows, snapping turtles, and fox snakes are about the only enemies that must be combatted.

Weights of game

Gerstell, Richard. Pennsylvania's field game investigations, pp. 365-368.

Report on a program in existence about 6 months. Among interesting findings were that only about 2 percent of the ruffed grouse in Pennsylvania are of the gray phase; that the birds weighed from 0.79 to 1.76 pounds, average of 187, 1.35 pounds. Of 104 specimens accurately sexed, 62 were males and 42 were females. The weights of 47 quail were: Lightest 4.6 ounces, heaviest 6.4, average 6.05. Similar figures for 428 male pheasants are: Minimum 2.00 pounds, maximum 3.82, average 2.87.

Deer weights vary greatly, due apparently to the degree of overbrowsing chacterizing different sections of the State. The average weight of 41 bucks from a county where food conditions were good was 116 pounds (hog dressed), and of 25 from an overbrowsed area only 75 miles distant, 94 pounds.

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WILDLIFE REVIEW

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Washington, D. C. No. 7 December, 1936

Biological Survey: Annual Report, 1935-1936

Gabrielson, Ira N. Report of the Chief of the Bureau of Biological Survey, 1936 (Biological Survey, Washington, D. C.), 68 pp., December 1936.

The usual annual summary, nearly 30 pages of which are devoted to an account of refuges and the refuge program of the Survey. At the end of the year, refuges under administration numbered 164, totalling over nine million acres, and 50 additional were in process of establishment. Practically the entire content of the report is of interest to wildlife managers, but of special pertinence may be mentioned the account of progress made in establishing cooperative research and demonstration units in wildlife management, reports on various food habit investigations, research on diseases of wildlife, life histories of fur animals, the status of waterfowl, and upon forest and range faunas.

Classification: Deer of the Pacific Slope

Cowan, Ian McT. Distribution and variation in deer (Genus Odocoileus) of the Pacific Coastal Region of North America, Calif. Fish and Game (450 McAllister St., San Francisco, Calif., 25 cents a copy), 22(3), July 1936, pp. 155-246, figs. 51-63, 3 graphs, 8 tables.

Variations are discussed as they are correlated with sex, age, individuality, and geographic origin. Pelage and molts, skin glands, antlers, and teeth are described in relation to classification. A key to the adult males of 11 forms is presented as well as systematic accounts of the subspecies embracing synonymy, range, coloration, cranial and antler details, and comparative discussion. Bibliography of 152 titles. A detailed and comprehensive report evidently of high quality.

Conservation: Crow question

Lumley, Ellsworth D. The crow as a "villain", Nature Magazine (1214 Sixteenth St., N. W., Washington, D. C., 35 cents a copy), 28(6), Dec. 1936 (Nov.), pp. 366-367, 1 photo.

Reduction in shooting seasons and bag limits stimulated ammunition manufacturers and sporting magazines to urge crow shooting for business reasons. Anti-crow propaganda described (and references given), including efforts to establish crow shooting as a sport and to popularize crows as food. "If the time, money, and energy expended in crow killing campaigns were spent in projects based upon the findings of science and research, real conservation would be accomplished. It will be necessary for men to think, reason, and abide by the findings of wildlife authorities, rather than to accept as true the propaganda spread by selfish concerns, if wildlife conservation is to advance."

Conservation: In national parks

Anon. Predators in the national parks, Parks and Recreation (327 W. Jefferson St., Rockford, Ill., 25 cents a copy), 20(1), Sept. 1936, pp. 37-41, 3 photos.

Notes on estimable qualities of predatory animals. "The National Park Service believes in conserving all animals within the park system, whether they be predators or those animals that are more popular with the public."

Conservation: In Pennsylvania

Luttringer, Leo A., Jr. Game returns to the land of William Penn, American Forests (919 Seventeenth St., N. W., Washington, D. C., 35 cents a copy), 42(9), Sept. 1936, pp. 403-407, 437, 10 photos.

History of the Pennsylvania Board of Game Commissioners, the protective laws, and the refuge system of the State. There are 132 primary refuges totalling 109,517 acres, and auxiliary refuges comprising 23,506 acres. They serve State hunting lands amounting to 507,406 acres. "Refuge keepers destroy all the predatory creatures that they can." Over $100,000 is spent annually in bounties for wildcats, gray foxes, weasels, and goshawks. In 1935 State game farms shipped for restocking purposes 45,398 ring-necked pheasants, 9,181 bobwhites, 3,593 wild turkeys, and 833 wild ducks. In addition over 77,000 cottontails were purchased and released. The annual value of game is estimated at $6,000,000, fur $2,000,000, and expenditures by hunters, $10,000,000.

Conservation: Policies, Wildlife Institute

Anon. Wildlife for the future, American Wildlife Institute (Investment Bldg., Washington, D. C.), 24 pp. copiously illustrated with photographs, Nov. 1936.

A statement of the Institute's aims and an appeal for cooperation. Briefly recites the damage done by pollution, drainage, fire, overgrazing, and other destructive factors. The Institute is designed to work with other organizations, and not to compete with them. Account of the cooperative demonstration projects at land grant colleges and of plans for other researches. Of special interest to the wildlife management group are labelled photographs of Aldo Leopold, Herbert L. Stoddard, Gardiner Bump, Carl L. Hubbs, and George C. Embody. "American Wildlife", the Institute's official magazine, said to be "the only publication devoting most of its attention to wildlife management."

Control: Aquatic birds

McAtee, W. L., and S. E. Piper. Excluding birds from reservoirs and fish ponds, U. S. Dept. Agr. Leaflet (Superintendent of Documents, Washington, D. C., 5 cents a copy) 120, 6 pp., 3 figs., Oct. 1936.

This is a contribution to preventive, as opposed to punitive, methods of control. Wide-spaced wiring to deter birds from alighting on water supply reservoirs, and closer screening to protect small fish ponds are recommended and described.

Control: From a conservationist's view point

Vorhies, Charles T. Rodents and conservation, Nature Magazine (1214 Sixteenth St., N. W., Washington, D. C., 35 cents a copy), 28(6), Dec. 1936 (Nov.), pp. 363-365, 379, 4 photos.

Criticism of the course of Federal agencies in the conservation field in the past four years. Rodent control ignores beneficial activities of the animals. Jack rabbits and wood rats are "animal weeds" on the range and are an effect, rather than a cause, of overgrazing. The range is not worth what is spent on it for rodent control; on a large area near Tucson, Arizona, the cost was 19 cents per acre, but cattlemen pay only 4 cents per acre for the grazing. To remove the number of jack rabbits that would consume as much forage as one cow cost, in the case of the antelope jack rabbit $23.68, and in that of the California jack rabbit $47.36; "the livestock was worth possibly $20 to $25 per head." Reduction in livestock is what is needed to restore the range; areas protected from stock come back regardless of their rodent population. The elimination of rodents will have a serious effect upon carnivorous fur bearers. The use of C.C.C. workers in control campaigns is deplored.

Control: Protecting trees from deer

Mills, E. M. Protecting trees from deer, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 7(6), Sept. 1936, pp. 20-21, 6 illus.

Deer show a distinct preference for cultivated plants. Kinds of trees and other crops damaged and nature of the injury. 87 two-year-old trees destroyed in three nights by one deer; 175 destroyed in one night by six deer. Unsuccessful deterrents were rags hung on the trees, sprays, and fences not prohibitive in cost. Successful protectants included asafoetida, naphthalene, tar-paper cones, and automatic flash guns. Trapping of possible value but laborious and expensive.

Control: Rats

Hamilton, W. J., Jr. Rats and their control, Cornell University Agr. Expt. Sta. (Ithaca, N. Y.) Extension Bul. 353, 32 pp., 11 figs., June 1936.

Injurious tendencies of the rat described, and life history briefed; control measures treated under the heads of poisoning, gassing, imprisoning and clubbing, trapping, use of dogs, and miscellaneous methods. Rat-proofing, rat campaigns, and natural enemies also are discussed.

Control: The "vermin" problem

Key, Louis A. Where are we headed with vermin control?, Ohio Outdoor News (210 N. Court St., Circleville, Ohio, 5 cents a copy), 2(5), Nov. 1936, p. 2.

After a decade of indiscriminate slaughter of "vermin", can any man point out any gain in the Ohio small game supply? The game situation is more precarious than ever before in the history of the State and man is responsible. There is no necessity for hunting and it must be restricted.

Cycles: Blue jay

Snyder, L. L., and T. M. Shortt. 1933, a "Blue Jay Year", Canadian Field Nat. (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 50(7), Oct. 1936, p. 118.

Unusual numbers bring up the question as to whether the blue jay population fluctuates periodically.

Cycles: Hungarian partridge

Rowan, William. The partridge situation in western Canada, The Sportsman (10 Ferry St., Concord, N. H., 50 cents a copy), 20(3), Sept. 1936, pp. 43, 63, 1 fig.

From plantings made in 1908 and 1909 the birds have spread "nearly a thousand miles east and five hundred northward." The author believes the species has joined the group of cyclically fluctuating birds and mammals of the region, a matter, as he says, "of exceptional biological interest."

Cycles: Ruffed grouse

Clarke, C. H. Douglas. Fluctuations in numbers of ruffed grouse, Bonasa umbellus (Linne), with special reference to Ontario, University of Toronto Studies (University of Toronto Press, Toronto, Canada, $1.00 a copy), 41, 118 pp., 15 figs., 11 tables.

Reviews the literature of the subject, and describes methods employed in his investigation. The fluctuations in population are not strictly regular

and do not occur simultaneously throughout the province of Ontario. The diminution took the form of a dying-off from disease, probably due to Leucocytozoon bonasae affecting chiefly young grouse and taking place in the summer. A total of 17 species of animal parasites are known to affect ruffed grouse; mycosis also is reported. Among other findings of interest is that general size of grouse territories was from 3 to 10 acres, and the minimum apparently 2 acres. Ruffed grouse do not inhabit: (1) Unbroken forest of any type; (2) grazed woodlots; (3) purely coniferous woods; (4) areas of solid brush without trees or open spaces; and (5) brules where the second growth poplar or conifers had not yet reached about twenty feet in height, unless a considerable residue of the original forest is left. Bibliography of 217 titles

Cycles: Snowshoe hare

Lloyd, Hoyes. The late Norman Criddle's record of the snowshoe rabbit (Lepus americanus) at Aweme, Manitoba, Canadian Field Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 50(8), Nov. 1936, pp. 129-130, 1 graph.

A record of abundance extending over 35 years expressed in a curve in which the high points are for 1905, 1913-4, and 1921-3.

Cycles: Solar in relation to biological

MacLulich, D. A. Sunspots and abundance of animals, Journ. Royal Astronomical Soc. Canada (J. H. Herning, 198 College St., Toronto, Canada, 25 cents a copy), 30(6), July-Aug. 1936, pp. 233-246, 2 graphs.

The author briefly reviews much of the previous literature and points out various factors of error. He brings out that phenomena which show fair correlation over a short period may fail to do so over a notably longer one. Including all of the data available, and eliminating all errors, so far as possible, the author demonstrates that the lynx and rabbit cycles as shown by fur returns are not correlated with periods of sunspot abundance. The average length of the cycles were 9.7 years for the lynx, and 11.1 for the sunspots; and figured on a somewhat different series of years, 9.6 years for the rabbit cycle and 11.0 for the sunspots. While fluctuations in numbers of the animals are not correlated with sunspots they are strongly correlated with each other. Bibliography of 41 titles.

Cycles: Sun rhythms

Abbot, C. G. The influence of solar variability on weather, Sci. Monthly (Lancaster, Pa., 50 cents a copy), Aug. 1936, pp. 108-121, 14 figs.

About the same material as was abstracted in WILDLIFE REVIEW, No. 1, Sept. 1935, pp. 3-4.

Destruction: By hunting

Chambers, W. Lee. The hunter in southern California versus wild animal life, The Condor (2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 38(5), pp. 199-202.

The author has been in the sporting goods business for 40 years; he comments on development in the efficiency of firearms, the use of almost all living creatures for targets, and the effects upon wildlife. He ends by saying "I firmly believe that the future of birdlife in this territory is doomed unless something is done to stop the tremendous slaughter by target, or practice, shooting. Large sanctuaries offer the only positive protection, and outside them everything larger than a sparrow is destined for destruction."

Destruction: Of mammals

Edge, Rosalie. Finishing the mammals, Emergency Conservation Committee Publications (734 Lexington Ave., New York, N. Y., no charge), 7, 1936, 24 pp., illus., 1 table.

Destruction of mammals below the size of "big game" by trapping and hunting, in "vermin" and control campaigns, and for bounties. A powerful indictment of man's destructiveness.

Destruction: Passenger pigeon

Mitchell, Margaret H. The passenger pigeon in Ontario, Contributions Royal Ontario Mus. Zool. (Toronto, Canada, $1.00 paper, $1.50 cloth), 7, 1935, 181 pp., illus.

An exhaustive account of much broader geographic scope than indicated by the title. Of interest in our work, chiefly as showing how a species of apparently limitless abundance was steadily and relentlessly destroyed by man.

Disease

Brigham, Geo. D. Susceptibility of the opossum (Didelphis virginiana) to the virus of endemic typhus fever, U. S. Public Health Reports (Superintendent of Documents, Washington, D. C., 5 cents a copy), 51(13), March 1936, pp. 333-337, 4 figs., 1 table.

The studies here reported indicate that the opossum is susceptible to the virus of endemic typhus fever (adapted from Experiment Station Record 75(3), Sept. 1936, p. 373).

Disease

Brigham, Geo. D. A strain of endemic typhus fever isolated from the brain of a wild rat, U. S. Public Health Reports (Superintendent of Documents, Washington, D. C., 5 cents a copy), 51(13), March 1936, pp. 337-339.

From Rattus norvegicus trapped in Montgomery, Ala. (adapted from Experiment Station Record, 75(3), Sept. 1936, p. 399).

Disease

Elton, Charles, D. H. S. Davis, and G. M. Findlay. Journ. Animal Ecology (Cambridge University Press, Fetter Lane, London, E. C. 4, England), 4(2), Nov. 1935, pp. 277-288, pl. 9, 4 tables.

Author's summary: "On the basis of trapping and trace censuses an epidemic among voles (Microtus) was forecast in the Newcastleton area of southern Scotland for the spring of 1934. This was expected as the result of a periodic maximum in numbers shown in 1933. Field and laboratory studies were carried out during the first 6 months of 1934, involving census work, breeding voles, collection of live voles and pathological examinations and experiments. A severe epidemic occurred with a peak mortality in April and May, voles dying in the laboratory with a protozoan infection of the brain due to Toxoplasma. This was successfully transmitted to stocks of normal healthy voles and no deaths were found due to causes other than Toxoplasma. Since Toxoplasma was found to cause similar mortality on two other areas in 1933 it is evidently an important controlling factor in the short-period fluctuation known to occur among vole populations in Britain."

Disease

Green, R. G., J. E. Shillinger, and Carl L. Larson. Minnesota Wildlife Disease Investigation (obtainable from Dr. J. E. Shillinger, Biological Survey, Washington, D. C.), June 1936, pp. 181-198, tables 110-114.

Continuation of report on Shock Disease of snowshoe hares (see WILDLIFE REVIEW, No. 5, Sept. 1936, p. 9) giving an account of the gross and microscopical pathology. The section on Lake Alexander Investigation contains notes on tularemia, tick infestation, pathological reports on trapped and captive hares, and on autopsies of miscellaneous mammals and one bird.

Disease

Morley, L. C., and P. W. Wetmore. The etiology of ulcerative enteritis in upland game birds, Science (Lancaster, Pa., 15 cents a copy), 84(2177), Sept. 18, 1936, pp. 272-273.

Ulcerative enteritis or "quail disease" usually resulting from overcrowding is a highly infectious and rapidly fatal disease that affects most species of native upland game birds. Description of lesions of the disease; diagnosis may be made by feeding infective material to test birds. The causative organism has been isolated and is described as Corynebacterium perdicum, new species.

Disease

Shaw, R. M., and Gretta S. Simpson. Clostridium botulinum Type C in relation to duck sickness in the Province of Alberta, Journ. Bacteriol. (Williams & Wilkins Co., Baltimore, Md.), 32(1), July 1936, pp. 79-88, 3 tables.

A severe epidemic among wild ducks occurring in southern Alberta in the summer of 1933 was identified as botulism. Bacterial cultures were made from tissues of dead ducks; their morphology and culture reactions are described. Experiments to determine toxicity to pigeons are set forth; large doses of strong toxin killed birds within two hours after the first observed symptom. It was found possible to protect pigeons against botulism by the use of antitoxins.

Disease: Parasites

Brandt, B. B. Parasites of certain North Carolina Salientia, Ecological Monographs (Duke University Press, Durham, N. C.), 6(4), pp. 491-532, 15 tables.

The parasites of the bullfrog, at least, may be of direct, while those of other frogs and toads may have indirect, interest for the wildlife manager. This treatment describes methods of study, and discusses the occurrence of parasites by species and by ecological groups of hosts, and comments on variation in parasitism as related to seasons, and size and age of hosts. The total number of species of parasites reported from the bullfrog is 35. There is an extensive bibliography.

Disease: Parasites

Chandler, Asa C. The genus Schizotaenia in porcupines, Journ. Parasitology (Science Press, Lancaster, Pa.), 22(5), Oct. 1936, p. 513.

Occurrence of two species of this genus in American porcupines.

Disease: Parasites

Harkema, Reinard. The parasites of some North Carolina rodents, Ecological Monographs (Duke University Press, Durham, N. C., $1.50 a copy), 6(2), April 1936, pp. 153-232.

General review of work on rodent parasites. Description of methods, and of numbers of species and specimens used in this study. Parasites are listed according to hosts, the maximum number of kinds - 13 - being recorded for both the brown rat and cottontail. There is also a list of the parasites reported from North American Rodentia and Lagomorpha and an extensive bibliography.

Disease: Parasites

Roudabush, Robert L. Arthropod and helminth parasites of the American bison (Bison bison), Journ. Parasitology (Science Press, Lancaster, Pa.), 22(5), Oct. 1936, pp. 517-518.

Record of ticks, warbles, and internal parasites from 13 bisons slaughtered on the Wichita National Game Preserve, Oklahoma.

Disease: Parasites

Warwick, Tom. The parasites of the muskrat (Ondatra zibethica L.) in the British Isles, Parasitology (Cambridge University Press, Fetter Lane, E. C. 4, London, England), 28(3), July 1936, pp. 395-402, 3 tables.

This study revealed 5 helminths, two of which were introduced with the muskrat; three common ectoparasites also from North America, and three of rare occurrence from the British fauna. "Introduction into Britain has greatly depleted the original helminth fauna as regards number of species and individuals; but not so with the ectoparasites."

Ecology

Gordon, Robert B. A preliminary vegetation map of Indiana, Amer. Midland Nat. (University Press, Notre Dame, Ind.), 17(5), Sept. 1936, pp. 866-877, 3 pls., 1 folded map.

Descriptions and map showing, in black and white, approximate distribution of 8 major types of vegetation. The author urges detailed county surveys and says, "These will be of tremendous practical importance in land utilization and in wild life management projects." There is a bibliography of 26 titles.

Ecology

Taylor, Walter P. Some effects of animals on plants, Sci. Monthly (Lancaster, Pa., 50 cents a copy), Sept. 1936, pp. 262-271.

A plea for the scientific management of wildlife in the light of all the facts. Discussion of grass feeders and the part they play on overgrazed ranges; the effects of animal feeding on plants other than grasses; the role of animals in cross-fertilization of plants; and summary of the effects of animals on plants, including a systematic outline of the subject.

Ecology

Williams, Arthur B. The composition and dynamics of a beech-maple climax community, Sci. Publ. Cleveland Mus. Nat. Hist. (Cleveland, Ohio), 6, July 1936, 92 pp., 16 figs., 23 tables. First printed in Ecological Monographs 6(3), July 1936, pp. 317-408 (Duke University Press, Durham, N. C.).

A thorough study of a 65 acre tract, the most interesting results of which for conservation biologists are those relating to wildlife populations. In four years mammals were found to vary in number from 109 to 529 per acre and nesting birds from 2 to 2.7 pairs (4 to 5.4 individuals) per acre. Such figures again suggest the great but comparatively neglected economic role of mammals in comparison with birds. Fluctuations in populations are described and discussed. Bibliography of 65 titles.

Ecology: Bird numbers

Hardy, Eric. Bird life on the farm, Discovery (Bouverie House, Fleet St., London, E. C. 4, England, 1 shilling (25 cents) a copy), 17(201), Sept. 1936, pp. 290-291.

Of interest for comparison with American figures. "The resident summer bird population of the 56,323,366 acres of Britain worked out at about 200,000,000." This is at the rate of 3.55 birds per acre. "The house-sparrow is the most numerous bird, both in town and country." "Land where game birds are reared has a more concentrated and varied wild bird population than land without game." The writer's statement that artificial manures decrease insect populations does not agree with the findings of the Imperial Chemical Industries. (Advisory Leaflet No. 7, Jan. 1935, abstracted in WILDLIFE REVIEW, No. 3, April 1936, p. 27.)

Ecology: Mink

Marshall, William K. A study of the winter activities of the mink, Journ. Mamm. (Wm. H. Burt, Museum of Zoology, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(4), Nov. 1936, pp. 382-392, 2 pls., 1 fig., 3 tables.

Field identification of sexes possible because of different sizes of tracks; notes on extent of winter movements, use of dens, routine, effect of temperature on activity, mating behavior, and cover type preferences. The winter territory of the female tends to be restricted to an area of approximately 20 acres; that of males is more extensive. Directions for a census of minks are given. In the area studied (southern Michigan) there was a population of 1.5 females per section. Bibliography of 11 titles.

Ecology: Mole

Arlton, A. V. An ecological study of the mole, Journ. Mamm. (Wm. H. Burt, Museum of Zoology, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(4), Nov. 1936, pp. 349-371, 5 figs., 2 tables.

Comprehensive report on habitat, community relations, behavior, structure and adaptations, and economic status. Localities, Iowa and Nebraska. Concludes that moles are beneficial in fields and should not be destroyed. Bibliography of 27 titles.

Ecology: Mosquito control operations

Cahalan, John I. Mosquito control vs. wildlife in Delaware. Affirmative. Delaware Sportsman (Box 872, Wilmington, Del., 25 cents a copy), 2(2), Oct. 1936, p. 8.

One side of the published version of a debate at a meeting in Dover, Del., Oct. 6, 1936; for the other see Vogt, below. The affirmative stresses the necessity of mosquito control from a public comfort and health standpoint; claims improvement in marsh conditions through control of water levels with resulting benefit to muskrat farming; denies that the growth of wigeongrass is adversely affected; and cites various financial gains to the State due to mosquito control operations.

Ecology: Mosquito control operations

Vogt, William. Mosquito control vs. wildlife in Delaware. Negative. Delaware Sportsman (Box 872, Wilmington, Del., 25 cents a copy), 2(2), Oct. 1936, pp. 9, 11, 2 photos.

Part of a debate; see also Cahalan above. Wildlife food supply diminished by marsh drainage; useful, being supplanted by useless, plants. Some marshes ditched and their ecology changed, yet remain mosquito breeding areas. Claims that wigeongrass and sago pondweed are destroyed in ponds by ditching, and that the muskrat industry is damaged by mosquito control operations.

Ecology: Number of toads

MacLulich, D. A. Census of American toads, Bufo americanus, Copeia (Museum of Zoology, University of Michigan, Ann Arbor, Mich., 75 cents a copy), 1935(4), December, p. 181.

One summer's observations on seven quarter-acre tracts in an Ontario white pine forest indicated a population of about 7 toads to the acre.

Ecology: Opossum

Yeager, Lee E. Winter daytime dens of opossums, Journ. Mammalogy (Wm. H. Burt, Museum of Zoology, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(4), Nov. 1936, pp. 410-411, 2 tables.

Percentage in trees (16.7), logs (30.5), etc., details as to height level (whether under or above ground), and type of habitat in which dens were located. Mississippi.

Ecology: Photoperiodism

Bissonnette, T. H. Sexual photoperiodicity, Journ. Heredity (1918-32 Harford Ave., Baltimore, Md., 35 cents a copy), 27(5), May 1936, pp. 171-180, 4 figs.

The subject according to the subtitle of this article is the "influence of varying quantities and qualities of light on sexual activity in plants and animals an example of the interaction of genetic and environmental factors in conditioning the expression of characters." It is difficult to summarize a paper which itself is essentially a summary of existing knowledge for its field. The author is one of the leading students of the subject and eminently capable of pointing out the significant findings embodied in the literature, 105 titles of which are cited in the terminal bibliography.

Ecology: Rodents in grassland

Phillips, Paul. The distribution of rodents in overgrazed and normal grasslands of central Oklahoma, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 17(4), Oct. 1936, pp. 673-679, 1 fig., 1 table.

Author's summary: "Comparative data were obtained on the distribution of various common rodents and lagomorphs in grasslands of Central Oklahoma. Pellet counts indicated that jack rabbits were most abundant in moderately overgrazed areas and cottontails preferred the cover afforded by undisturbed grasslands. Mound counts showed pocket gophers more numerous in mowed hayfields and moderately overgrazed pastures than in either heavily or overgrazed or undisturbed areas. Ground squirrels occurred more often in mowed hayfields. Trapping showed that deer-mice were most numerous in moderately overgrazed grassland while cotton rats were almost entirely restricted to heavily grassed undisturbed areas." Abstracter's comment: The findings of this paper indicate that the animals studied are largely controlled in their distribution by overgrazing which they do not originate. There is an interesting bibliography of 17 titles.

Ecology: Rodents in relation to erosion

Renner, F. G. Conditions influencing erosion on the Boise River watershed, U. S. Dept. Agr. Tech. Bul. (Superintendent of Documents, Washington, D. C., 5 cents a copy) 528, 32 pp., 14 figs., 11 tables, Oct. 1936 (December).

Rodent infestation is discussed on pages 22-24. While overgrazing and compacting of the soil by stock are recognized as the primary cause, "Rodents appear to have been an important factor contributing to the accelerated erosion. These animals have partially depleted the vegetation and disturbed the soil over four-fifths of the area studied. In addition, their effect upon erosion has probably been increased by their habits of concentration on southerly exposures and other areas which are heavily grazed by livestock." However, "The erosion was found to vary directly with the degree to which the vegetation cover has been depleted and the surface conditions disturbed by the grazing of livestock. Almost without exception, the areas which have been grazed most heavily are examples of the most severe erosion." (p. 32.) The case seems allied to that of the so-called "vermin" as in neither would the animals concerned have been regarded as destructive, had they not been forced into that position by becoming accessory to the overwhelming destructiveness of man and his works.

Ecology: Sampling insect populations

Carpenter, J. Richard, and John Ford. The use of sweep net samples in an ecological survey, Journ. Soc. for British Entomology (University Museum, Oxford, England), 1, Aug. 1936, pp. 155-161, figs. 11-12, 3 tables.

The possible utility to the wildlife manager of a simple method of sampling insect populations was mentioned in WILDLIFE REVIEW, No. 1, Sept. 1935, p. 32. The paper here cited is an experimental and statistical study of the subject which indicates that a considerable number (75) of sweeps may be necessary for accuracy in securing representative samples. On the other hand the wildlife manager does not require a high degree of accuracy so the former recommendation of from 6 to 9 sweeps, each travelling through about 8 feet of the vegetation, may be depended upon to give a sufficiently good indication of the insect population.

Ecology: Wildlife survey

Taylor, Walter P. A national wildlife survey, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 25(5), Sept.-Oct. 1936, pp. 69, 77.

Land-planning rests on land classification for which full information is needed in order that each tract may be devoted to its highest use. Knowledge of the distribution and abundance of wildlife is very superficial and a thorough and continuing biological survey by adequately trained personnel is requisite.

Economics

Hoover, Earl E. New Hampshire's game resources, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 25(4), July-Aug. 1936, pp. 51, 58, 60, 2 figs., 4 tables.

"Almost $6,000,000 is spent in New Hampshire each year by hunters and fishermen x x x Ninety-seven percent of the total expenditure is distributed among private business interests." The directions in which these funds are spent are analyzed both for resident and non-resident sportsmen. The data used were obtained from replies to a questionnaire sent to every tenth license holder.

Education

Bode, I. T. Cooperative units showing results, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 25(4), July-Aug. 1936, pp. 56, 61-63, 4 photos.

A summary of plans and accomplishments to date of wildlife research and demonstration projects established at land grant colleges in nine States.

Education

Ingles, Lloyd G. Small wild mammals of California, California State Dept. of Education Science Guide for Elementary Schools (Sacramento, Calif., 15 cents a copy), 3(1), Aug. 1936, 44 pp., 17 figs.

Simple key to genera; popular account of representative species; small mammals and conservation; a suggested curriculum; useful references.

Education

Reid, D. H. An elective course in game conservation and management at A. & M. College, College Station, Texas, Poultry Science (450 Ahnaip St., Menasha, Wis., 75 cents a copy), 15(3), May 1936, pp. 223-224.

Popular account of the conduct of the course including study of means of recognition of important species, of past and present abundance of wildlife and the governing factors, inspection of management operations on farms, study of food habits and diseases of wildlife, of hunting practices, farmer-sportsman relationships, and legal protection. The course covered fishes as well as land vertebrates.

Education: Alabama Cooperative Wildlife Research and Demonstration Project

Peters, Harold S. Wildlife Research Station reports on four game projects, Ala. Game and Fish News (Dept. of Conservation, Montgomery, Ala., 10 cents a copy), 8(6), December 1936, pp. 4-5, 13-15.

Report of progress during first 10 months, on projects devoted to the mourning dove, bobwhite, white-tailed deer, and waterfowl.

Farmer-sportsman relationship

Morton, James N. The sportsman and the landowner, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(7), Oct. 1936, pp. 2-3, 2 photos.

Discussion of this vexed problem by one who is experienced in both sides of it.

Food Habits: Dew as a water supply

Dalke, Paul D. Water for pheasants, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 25(5), Sept.-Oct. 1936, p. 70, 1 photo.

In southern Michigan dew is available for a few hours after sunrise on many summer days. The amount in quarts per acre varies from 3 to 25 or more, according to the abundance of the condensed moisture. Notes are given on the dew retaining qualities of various plants.

Food Habits: Grouse

Schmidt, F. J. W. Winter food of the sharp-tailed grouse and pinnated grouse in Wisconsin, Wilson Bul. (Dr. T. C. Stephens, Sioux City, Iowa, 60 cents a copy), 48(3), Sept. 1936, pp. 186-203, 3 figs., 1 table.

The condensed and informative quality of this report indicates what a great loss conservation biology has suffered in the tragic death of its author, Aug. 7, 1935, in a fire that consumed also his accumulated notes, photographs, and manuscripts. In this report are presented worth while notes from the literature but chiefly the results of obviously exact and thorough field investigations of the author. They relate to all classes of food which are ranked in value, and compared as to utility, for 4 kinds of American grouse and the red grouse of Great Britain. Suggestions are made as to artificial feeding and other food management practices and a table given showing the palatability sequence of winter foods for the prairie sharp-tailed, the northern sharp-tailed, the pinnated, and the ruffed grouse.

Food Habits: Hawks

Poole, Earle L. Enter hawk - exit mouse, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(7), Oct. 1936, pp. 17, 25, 27, 2 illus. by author.

A watershed on which no hunting was permitted developed an abundance of wildlife. Birds of prey were numerous, yet hundreds of pheasants and thousands of rabbits were trapped for distribution elsewhere. A game trapper took it upon himself to shoot as many of the hawks as possible. These were rough-legs and their stomachs contained meadow mice, exclusively. Previous studies had shown the food of other hawks and owls on this area to consist of meadow mice to the proportion of about 95 percent. Damage to trees by mice convinced the head of the water bureau that more, not fewer, hawks were needed on the area and orders were given that no more shooting of birds of prey be permitted.

The author's concluding paragraph is: "The fact that Ringnecked pheasants and rabbits are more abundant on the area which I have described, than in any equal area with which I am familiar, amply demonstrates that the six species of hawks and owls most abundant on the area, namely, the Red-tailed, Red-shouldered, Rough-legged, Marsh and Sparrow hawks, and the Barn and Short-eared Owls, will pay little attention to anything else, so long as their natural food, the meadow mouse, is abundant and easily obtained."

Food Habits: Marsh hawk

Errington, Paul L., and W. J. Breckenridge. Food habits of marsh hawks in the glaciated prairie region of north-central United States, American Midland Naturalist (University Press, Notre Dame, Ind. Write for price), 7(5), Sept. 1936, pp. 831-848, 4 tables.

Part of authors' summary: "The marsh hawk, in common with most other predators, seems to feed chiefly upon whatever it finds conveniently available as food, whether that food be carrion (of fresher grades) or captured prey. The carrion eaten is represented in large measure by carcasses of animals killed along highways by motor traffic; the prey, by young rabbits, mice, the smaller ground squirrels, passerine birds, and young or crippled individuals of larger species, including ring-necked pheasants.

"From the findings of intensive studies of vertebrate populations, it is becoming increasingly apparent that the role of predation in determining population levels of prey species may be of far less consequence on the whole than has been previously believed. A great deal of the pressure of predators - that of marsh hawks included - seems to be centered upon those proportions of the prey populations that tend to exceed the capacities for accommodation of their respective habitats."

Bibliography of 28 titles.

Food Habits: Rabbit damage

Anon. Rabbit damage in relation to time of planting, Southern Forestry Notes (Southern Forest Expt. Sta., New Orleans, La.), 17, Oct. 1936, pp. [3-4], multigraphed.

Rabbits damage slash, more than long-leaf, pine seedlings; in both cases damage decreases as the planting season progresses. Early planting of slash pine is recommended.

Food Habits: Squirrel, pine

Shaw, William T. Moisture and its relation to the cone-storing habit of the western pine squirrel, Journ. Mammalogy (Wm. H. Burt, Museum of Zoology, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(4), Nov. 1936, pp. 337-349, 2 pls.

Store cones in moisture which tightens them and preserves the seeds in good condition. Bibliography of 10 titles.

Food Habits: Squirrel, red, damage to conifers

Anon. Squirrels versus jack pine, Forest Research Digest (Lake States Forest Expt. Sta., St. Paul, Minn.), Sept.-Oct. 1936 (December), pp. 2-3.

Squirrels cutting off terminal shoots practically prevented height growth in an experimental stand of 1,000 sixty year-old trees in the Superior National Forest.

Food Habits: Squirrel, red, damage to conifers

Hart, Arthur C. Red squirrel damage to pine and spruce plantations, Journ. Forestry (Society of American Foresters, Mills Bldg., Washington, D. C., 65 cents a copy), 34(7), July 1936, pp. 729-730.

Apparently forced by heavy snowfall that rendered other foods inaccessible, red squirrels fed heavily on buds of conifers in plantations at Storrs, Conn. In one of 10 plantations not a single tree escaped damage.

Food Habits: Weasel

Errington, Paul L. Food habits of a weasel family, Journ. Mammalogy (Wm. H. Burt, Museum of Zoology, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 17(4), Nov. 1936, pp. 406-407.

Analyses of feces from a den near Ruthven, Iowa, revealed, by bulk, 3 percent remains of birds, 4 percent of insects, 56 percent of mammals. The birds were red-winged blackbirds and sparrows; the mammals, striped ground squirrels, rabbits, and mice.

Life Histories: Beaver

Green, H. U. The beaver of the Riding Mountain, Manitoba. An ecological study and commentary, Canadian Field-Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 50(1), Jan. 1936, pp. 1-8, 4 photos; (2), Feb. 1936, pp. 21-23; (3), March 1936, pp. 36-50, 9 photos; (4), April 1936, pp. 61-67, 3 photos; (5),May 1936, pp. 85-92, 1 photo.

Based on 3 seasons'field work in the Riding Mountain National Park, this report sets forth the general conditions of the environment and the history of the beaver there, which is one of continued destruction. "The hill billy type of settler with no ideas of conservation or of the aesthetic value of wild life is still responsible for the beaver's destruction as in the early days of settlement." The article gives weights, measurements, and anatomical descriptions; discusses the habits as to walking, swimming, diving, voice, and other means of communication, times of activity, feeding habits and food supply, lumbering and associated activities, and the construction of dams, lodges, and dens; gives information on the number of young, the migration of yearlings, "sign" of all kinds, parasites, and enemies. Poaching is the greatest threat to existence of the species in the region of the study. Constructive suggestions are given for restoration and management. The paper is of much value as a record of original field observations and is written from a wholesome conservation point of view.

Life Histories: Cottontail

Hendrickson, George O. Summer studies on the cottontail rabbit (Sylvilagus floridanus mearnsi (Allen)), Iowa State Coll. Journ. Sci. (Ames, Iowa), 10(4), July 1936, pp. 367-371.

Nine adult and 4 young were found on 15.5 acres, a density of one rabbit to 1.1 acres. Use of pellet counts to determine numbers, territories, and feeding ranges. The average number of rods from cover to the limit of territory in three tracts varied from 5.7 to 17.6 rods. Bibliography of 5 titles.

Life Histories: Double-crested cormorant

Mendall, Howard L. The home-life and economic status of the double-crested cormorant, Phalacrocorax auritus auritus (Lesson), The Maine Bulletin (University of Maine, Orono, Me.), 39(3), Oct. 1936, 159 pp., 12 pls., 1 map, 6 tables.

A very thorough report based chiefly on studies in Maine but also supplementing in some general aspects Harrison F. Lewis's comprehensive work of 1929. The disappearance and reappearance of this cormorant as a breeding species in New England is discussed, and an account given of its known distribution and migrations. The life-history studies cover all activities observable in Maine; these are treated in detail in chapters and generalized in a summary and in a statement of the ecology of the bird. As to economic status, information concerning which was gleaned from all sources, the conclusion is that the cormorant "is fully deserving of our protection, and that, except in scattered, local instances, it is largely neutral if not actually beneficial in its relationship to man." The bibliography comprises 106 titles.

Life Histories: Muskrat

Warwick, Tom. Methods of detecting muskrats, Annals of Applied Biology (Cambridge University Press, Fetter Lane, London, E. C. 4, England), 23(1), Feb. 1936, pp. 165-174, 2 figs., 1 table.

The observations made in the British Isles have at least comparative value as applied to the animal in America. Features of muskrat economy considered are houses, rush-ups, plugs, food-traces, burrows, footprints, and dung.

Life Histories: Pheasant ovipositing in nests of other birds

Bennett, Logan J. The ring-necked pheasant as a nesting parasite of other game birds, Iowa State Coll. Journ. Sci. (Ames, Iowa), 10(4), July 1936, pp. 373-375.

Author's summary: "1. Approximately 4.7 per cent of the Puddle Duck nests in the prairie area of Iowa are parasitized by the Ring-necked Pheasant; 2. apparently pheasant eggs deposited in duck nests reduce the potential number of duck eggs; 3. a small percentage of pheasant eggs deposited in duck nests hatch; 4. there is no apparent strife between nesting ducks and nesting pheasants; 5. a small percentage of King Rail nests, Virginia Rail nests, and European Partridge nests are parasitized by pheasants."

Life Histories: Raccoon

Hamilton, W. J., Jr. The food and breeding habits of the raccoon, Ohio Journ. Sci. (Ohio State University, Columbus, Ohio, 50 cents a copy), 36(3), May 1936, pp. 131-140, 1 pl., 1 chart.

Previous reports on the food of raccoons are reviewed and the results given of analyses of 127 stomachs taken in fall and winter in New York. Discussion is given of the principal items or groups of items constituting the food, of which those leading in frequency are buckwheat, apples, beechnuts, wild fruits and berries, corn, earthworms, mice and shrews, and insects. The normal period of gestation is 63 days. Stages in the growth of the young are described and illustrated. The number of raccoons annually taken in the United States "may well exceed the million mark." Recommendations for conservation of the species are made.

Life Histories: Ring-billed gull

Munro, J. A. A study of the ring-billed gull in Alberta, Wilson Bul. (Sioux City, Iowa, 50 cents a copy), 48(3), Sept. 1936, pp. 169-180, 2 pls., 1 table.

Descriptive notes on behavior, nests, eggs, young, casualties, enemies, food, and relation to other species.

Author's summary: "A nesting colony of Ring-billed Gulls together with a few California Gulls situated on an island in Bittern Lake, Alberta, maintained a population of approximately 800 pairs during the nesting seasons of 1932, 1933, and 1934. A study of food remains on the island indicated a diet, for the months of May and June, of grain, ground squirrels, carrion, ground beetles, and mice, named in the order of their importance. Evidence of ducks' eggs being eaten was detected in one instance. Eggs, most of them unconcealed, in an adjacent colony of Avocets were not destroyed by gulls. A brood of four newly-hatched Canada Geese were eaten. The data obtained are insufficient for definite conclusions regarding the local food habits of the species but are of sufficient interest to suggest that a detailed study is desirable."

Life Histories: Robin

Hamilton, W. J., Jr. Notes on nestling robins, Wilson Bul. (Dr. T. C. Stephens, Sioux City, Iowa, 50 cents a copy), 47(2), June 1935, pp. 109-111.

Data from 4 sets of robin nestlings observed and weighed at Ithaca, N. Y., are summarized as follows: "Newly hatched robins average 6.6 grams. At fourteen days, when leaving the nest, they weigh 56 grams. This is an increase amounting to more than eight times the original weight. x x x Robins feed their young, apparently regardless if there be three or five, approximately 3.2 pounds of food during the two weeks while in the nest."

Life Histories: Sex ratio in white-tailed deer

Gerstell, Richard. Sex ratio of whitetail deer progeny, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 7(5), Aug. 1936, pp. 6-9, 3 photos, 3 figs., 1 map.

The effect of "buck laws" has been to unbalance sex ratios. The ratio in fawns picked up at random over a period of 5 years was approximately one to one. That for over 11,000 deer of the year killed in a special season on unantlered deer in 1935 was approximately 2 females to each male. Coordinating the findings with data on overbrowsing previously obtained, it was found "that the fawn crop produced on the over-browsed portions of the Pennsylvania deer range showed a sex ratio wherein the female individuals outnumbered the male individuals by more than 2 to 1, while on the less heavily browsed portions of the range, the ratio never equaled or exceeded a 2 to 1 ratio in favor of the females." The author, therefore, concludes that "the poorer the food conditions the greater the tendency toward the production of females."

Abstracter's comment: The finding last quoted is contrary to those in other fields of biology where the production of females has been found to be favored by good, that of males by poor, nutritive conditions. The secret of the unbalanced ratios may be in a differential mortality in the sexes in early life, a phenomenon known in other animals, including man. The possibility of such a differential mortality indicates that the author's search for evidence as to the sex ratio in a normal deer herd in that of the fawns at birth may be illusory.

Management: Burning

Loffler, Ross L. Fire prevention and its relation to wildlife, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 7(6), Sept. 1936, pp. 4-5, 3 photos.

Forest fires destroy wildlife, are often caused by carelessness, and should be prevented so far as possible. This is an account that is in some respects inaccurate and which ignores the subject of controlled burning. Sweeping, devastating fires admittedly are calamities but fire properly used may be a most valuable tool in wildlife management. The silence and lack of life the author notes as characteristic of a recently burned-over tract is a temporary phenomenon. The area is soon reoccupied and for a period of years when ground cover is luxuriant will support more wildlife than an equal-sized tract of forest. The fact is ignored that unchecked forest growth, from the time of closure of the crown until partial opening of it again due to senility of the trees, smothers out food and cover plants, hence is detrimental to wildlife.

Management: Coon Valley S. C. S. Demonstration

Davis, Kenneth. Protecting fin, fur, and feather in Coon Valley, Soil Conservation (Superintendent of Documents, Washington, D. C., 10 cents a copy, stamps not accepted), 2(6), Dec. 1936, pp. 109-113, 6 photos.

In this valley one of the most seriously eroded agricultural sections of Wisconsin, more than 400 farmers signed contracts to cooperate with the Government for a 5-year period in controlling erosion on their farms. Erosion control practices of benefit to wildlife were made a feature of the work from the beginning. Revegetation of stream banks, gullied areas, and hillsides has improved cover facilities, and 312 food patches were planted on the edges of wooded areas. 161 feeding stations were operated during the first two winters but were discontinued the third, as natural food conditions in the valley had greatly improved. All of the work has been experimental in type so as to develop the best procedure along each line of endeavor. Figures are given for planting and stocking operations. The farmers seem definitely interested and it is felt that a good demonstration is being given of the desirability of making conservative, rather than exploitive, use of the land.

Management: Farm game

Darling, J. N., H. P. Sheldon, and Ira N. Gabrielson. Game management on the farm, U. S. Dept. Agr. Farmers' Bul. (Superintendent of Documents, Washington, D. C., 5 cents a copy, stamps not accepted) 1759, 22 pp., 14 figs., October 1936 (December).

With emphasis on the possibility of returns to landholders and on the practicability of solving farmer-sportsman problems, this bulletin asserts that game management is not a complicated practice and advises making game management fit the land. Suggestions are given for management of cover and food supplies and readers referred for further details to Farmers' Bulletin 1719, "Improving the Farm Environment for Wildlife." On the last page of the publication is a list of the Wildlife Research and Demonstration Units and a directory of State game agencies.

Management: Farm game

Mershon, Ralph. Wild life, a new farm crop, Southern Agriculturist (Nashville, Tenn., no price quoted), 66(10), Oct. 1936, pp. 6, 27, illus.

Discussion of the opportunity of combining soil-building policies of the Agricultural Adjustment Administration, erosion control practices urged by the Soil Conservation Service, and wildlife management recommended by the Biological Survey, to the advantage of wildlife, and profit to the farmer.

Management: Farm game, in Silesia

Leopold, Aldo. Farm game management in Silesia, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 25(5), Sept.-Oct. 1936, pp. 67-68, 74-76, 8 photos, 2 figs., 2 tables.

This and other articles resulting from the author's European tour give the American sportsman and wildlife manager much needed accurate information on game conditions and game management abroad. The Silesian country described

in this contribution is intensively farmed. Keeping game on it depends chiefly upon the maintenance of artificial coverts known as remises. These average about 2 acres in size; their structure and use in hunting operations are described. Feed patches of corn and Jerusalem artichoke usually are adjacent. Special coverts are provided for partridges and winter feeding of all game is practiced. Crops furnish the chief nesting cover and special methods are used to prevent birds nesting in those that are cut during the nesting period. Information is given on hunting methods, representative bags, and "vermin" control. Pheasants, partridges, hares, and roe deer are the principal game species. Success of the system depends mainly on the landowners' enthusiasm for it. "In no case does government raise game for the shiftless community."

Management: Feeding stations

LeCompte, E. Lee. Feed the birds, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md., 25 cents a copy), 13(4), 1936, pp. 13, 16, 1 photo.

Suggestions for winter feeding of both small birds and game birds.

Management: General statement

Hicks, Lawrence E. Wildlife resources of Ohio, Division of Conservation (Columbus, Ohio) Bul. 134, 5 pp., mimeographed, 1936.

Value of wildlife to the Nation, to Ohio, and to a single county in the State. Number of species of various groups; need of a wildlife handbook. Annual kill of game and fur species in Ohio.

Management: Herd control

East, Ben. Must they starve?, American Forests (919 Seventeenth St., N. W., Washington, D. C., 35 cents a copy), 42(10), Oct. 1936, pp. 463-465, 483, 6 photos.

Starvation of deer in winter yards in northern Michigan; between 300 and 500 deer died in a single winter in one 4,000-acre swamp. Feeding impracticable, hence herd regulation is necessary. Public sentiment places difficulties in the way of a control program and how to manage the situation is not yet apparent.

Management: Maryland Resettlement Project

Wilson, Kenneth A., and Ernest A. Vaughn. The Resettlement Administration and its wildlife program on the Eastern Shore of Maryland, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md., 25 cents a copy), 13(4), 1936, pp. 1-3, 5 photos.

Report of progress on a Resettlement Administration project. Clearing of drainage ditches in acid areas, plowing land to secure volunteering of food plants, and establishing feed patches all resulted in apparent increases in

wildlife populations. Farmers in general gave good cooperation in the planting of feed patches. Details of this cooperation in the area referred to and in other parts of the State are given in a report by E. Lee LeCompte on pages 19-22.

Management: Multiple use

Taylor, Walter P. The principle of "diversification" in the wildlife field, Science (Lancaster, Pa., 15 cents a copy), 84(2181), Oct. 16, 1936, pp. 350-351.

A plea for multiple, instead of specialized, use of natural resources.

Management: Planting

Hershey, John W. Balancing a wildlife program, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 25(5), Sept.-Oct. 1936, pp. 71, 78, 2 photos, 1 table.

Advises expenditure of a share of game funds for planting food-producing trees. Persimmon and honey-locust specially annotated. A table lists bushes and trees for wildlife in the Middle South and shows their bearing seasons.

Management: Planting

McAtee, W. L. Groups of plants valuable for wildlife utilization and erosion control, U. S. Dept. Agr. Circ. (Superintendent of Documents, Washington, D. C., 5 cents a copy, stamps not accepted) 412, 11 pp., 7 pls., October 1936 (November).

An expanded, printed, and illustrated version of the material first presented in U. S. Biological Survey, BS Leaflet 19 (see WILDLIFE REVIEW, No. 2, Jan. 1936, p. 21). Lists the genera of plants of most value in supplying cover, browse, herbage, mast, fruit, and seed for wildlife and indicates which of these groups have been recommended for use in erosion control.

Management: Planting

Westveld, R. H., and Rudolf Bennitt. Improving food and cover for wildlife on Missouri farms, Univ. Mo., Agr. Extension Sta. (Columbia, Mo.), Circ. 348, 8 pp., 1 table, July 1936.

"The surest way to restore wildlife is to increase the permanent breeding stock by improving the surroundings in which it lives." The meat of this circular is presented in a tabulation of recommended plants that indicates the soils to which they are suited, their value for food and cover, and their bearing seasons. Suggestions are given also as to the character and handling of planting material and as to maintaining favorable conditions in woodlands.

Management: Planting, seed preparation

Paton, R. R. Preplanting treatment of black cherry seed, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(7), July 1936, p. 730.

Plantings made in Ohio from five lots of seeds given different treatments showed that treatment is unnecessary to secure satisfactory germination. If early sprouting is desired, fermenting the seed before sowing is effective.

Management: Planting for waterfowl

Deck, Raymond S. Wild ducks at home, Country Life (444 Madison Ave., New York, N. Y., 50 cents a copy), 70(6), Oct. 1936, pp. 50-53, 10 photos.

American wild fowl have come to the zero hour; hunters have taken their fun with the birds, draining the cup to the dregs; now they had better pay back as best they may. Popular account of the restoration, planting, and success of a small refuge pond in Connecticut. Illustrations of 5 species of waterfowl and 5 duck food plants. One of the latter seems mislabelled Potamogeton natans; rather it appears to be P. americanus.

Management: Planting for wildlife, nuts

Morton, James N. Nut trees: their place in game management, Rep. Proc. 4th Ann. Meeting Penn. Nut Growers Assoc. (J. W. Hershey, Sec'y., Downington, Pa.), January 1936, pp. 19-21, mimeographed; Penn. Dept. Forests and Waters, Service Letter (Harrisburg, Pa.), 7(25), June 18, 1936, pp. 1-2.

Whatever other favorable conditions exist, food and cover are the great essentials for wildlife. Among foods, nuts are of first rate importance. Notes on utilization of the various kinds, including acorns, and their nutritive value. Suggestions as to how nut growers can aid the wildlife manager by producing varieties or hybrid stocks better adapted for various purposes than are existing kinds.

Management: Refuge, cooperative

Conklin, W. Gard. Cooperative farm refuge, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 5 cents a copy), 7(6), Sept. 1936, pp. 6-7, 4 illus., map on p. 27.

Statement of a project covering ten connecting farms totalling 1,507 acres (200 set aside for refuges) and the hopes that are entertained for its success. Copy of the agreement between the Board of Game Commissioners and the landholders.

Management: Stocking, chukar partridge

Anon. Chukar partridge new success in State, California Conservationist (303 State Office Bldg., Sacramento, Calif., 15 cents a copy), 1 (11), Nov. 1936, pp. 10-11, 2 photos.

Notes on range and habits of the species in Eurasia; 3,505 birds have been liberated in 26 counties since 1932; in a few localities definite evidence of breeding and increase has been obtained; the "situation looks promising."

Management: Stocking, elk

Gerstell, Richard. The elk in Pennsylvania: its extermination and reintroduction, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(7), Oct. 1936, pp. 6-7, 26, 2 photos, 1 graph, 1 map.

The elk, originally numerous, was exterminated in 1867. Reintroduced in 1913 and 1915, the animals increased despite some poaching and killing to protect crops, so that an open season was allowed annually from 1923 to 1931, inclusive. The total number of animals legally killed - 177 - was about the same as that introduced. While some stock remains, the experiment seems doomed to failure because the opening up of wilderness areas has decreased the suitability of the habitat and made the animals readily accessible to hunters.

Management: Stocking, mallard

Errington, Paul L., and W. E. Albert, Jr. Banding studies of semi-domesticated mallard ducks, Bird Banding (Charles B. Floyd, 95 South St., Boston, Mass., 50 cents a copy), 7(2), April 1936, pp. 69-73, 4 tables.

Of 350 Iowa game farm mallards traced by trapping and banding operations continued through three years, only 3 are known to have been killed by hunters, and those locally. The results confirm Lincoln's conclusions (Yearbook U. S. Dept. Agr., 1934, pp. 310-313) from observations on Long Island, N. Y., birds, namely, that hand-reared mallards do not join wild flocks and that their use so far as known is not effective in restocking operations.

Management: Stocking, quail

Errington, Paul L. Restocking quail in our northern States, Minnesota Conservationist (State Office Bldg., St. Paul, Minn., 15 cents a copy), Sept.-Oct. 1936, pp. 10-11, 15, 1 photo.

Carrying capacity under the very best conditions is about a bird per acre; a carrying capacity of a bird to 2 acres is excellent, and of one bird to 4 to 6 acres is good. The great regulator of populations in the north is the winter carrying capacity and only about so many birds survive in a given territory "regardless of how open the winters may be and regardless of the kinds and numbers of enemies present." Environmental improvement rather than

restocking usually is the best remedy for a quail shortage. When restocking must be undertaken, the birds used should be of the adapted strain and, so far as can be, assured sound in every respect.

Predation

Wing, Leonard. Predation is not what it seems, Bird-Lore (1775 Broadway, New York, N. Y., 30 cents a copy), 38(6), Nov.-Dec. 1936, pp. 401-405, 5 photos.

Notable losses from predation indicate that the environment is lacking in some feature necessary to adequate accommodation of the prey. Management implies removal of excess population and if it is not removed by man, predators should not be condemned for utilizing it. Argument exemplified by the history of deer that were fenced out of their wintering "yard", weakened by starvation, and then eaten by wolves.

Propagation: Jungle fowl

Bloodgood, Paul R. The red junglefowl, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 6(12), Dec. 1936, pp. 4-5, 2 photos.

Description; instructions as to care and use as foster mothers for which they are recommended.

ADDENDA

Classification

Klauber, Laurence M. A key to the rattlesnakes, with summary of characteristics, Trans. San Diego Soc. Nat. Hist. (Natural History Museum, Balboa Park, San Diego, Calif.), 8(20), pp. 185-276, figs. 1-112, Dec. 1936.

General discussion of the family Crotalidae, check-list of and key to the species and subspecies of Crotalus and Sistrurus; synonymy; summary of rattlesnake life history; notes on control and enemies, commercial value, the venom apparatus and treatment of snake-bite. With profuse illustration, including distribution maps.

Conservation

Parkins, A. E., and J. R. Whitaker, editors. Our natural resources and their conservation (John Wiley & Sons, Inc., 440 - 4th Ave., New York, N. Y., $4.00 a copy), 650 pp., many illus., 1936.

Probably the entire content of this volume will prove of interest to readers of WILDLIFE REVIEW, but Chapter 19, Conservation of Wildlife (pp. 485-526, 7 figs., by V. E. Shelford), and Chapter 20, Recreational Resources (pp. 527-557, 1 fig., by Edward C. Prophet), no doubt will have special appeal.

From the nature of the case, Shelford's account is more or less pessimistic. As an ecologist he makes the point that primeval biotic communities, which the nation has so freely destroyed, are not renewable resources. If any of those left are to be conserved they must be preserved and that on a hands-off basis. The effect of public opinion and action, especially through public agencies, upon American wildlife is described, and drainage, pollution, and politics receive about equal attention. An outline is given of the present condition of wildlife in national parks and other complete sanctuaries, in large forest and game preserves, public lands, grazing lands, and on farms. Reference is made to extinct, vanishing, and endangered species, introduced animals, and "vermin". The objects of preservation-conservation are defined, a system of buffer zoning to give partial protection to wide-ranging species is suggested, and the desirability of using the scientific method of check areas in wildlife management is emphasized. The requirements of restoration are rather fully treated. "The most fundamental requirement of wildlife preservation and conservation is control of the land on which the animals are found."

In the Chapter on Recreational Resources, by Prophet, wildlife is given due, but not conspicuous, attention. Hunting and fishing lands are classified and discussed under the divisions, private, government, and uncontested trespass, lands. "Uncontested trespass is rapidly becoming a thing of the past. If the American public is to have ready access to hunting land, then public agencies must acquire far more land than they now control in order to provide for the demand." Esthetic uses of land are not neglected and they are defined as use "by the sightseer who enjoys the beauties of the landscape but who does not tamper with or destroy the resource." Much damage has been caused "by mismanagement or utter failure to manage land" for recreational purposes, but in the last twenty years great progress has been made and the outlook is encouraging.

As an appendix to Chapter 19, there is a bibliography of 28 titles on pages 631-632, and to Chapter 20, one of 11 titles on pages 632-633.

Ecology: Dependence of wildlife upon vegetation

Osborn, Ben, and H. L. Whitaker. Significance of natural vegetation in planning erosion control and wildlife management, Soil Conservation (Superintendent of Documents, Washington, D. C., 10 cents a copy, stamps not accepted), 2(6), Dec. 1936, pp. 126-129, 4 photos.

All said about wildlife is here quoted: "Wildlife conservation, along with soil conservation, must deal with the vegetative cover of the earth. This cover is the home of wildlife species. It is both their shelter and their food. Each kind of animal has its own special requirements and lives in the particular type of vegetation which most nearly suits these needs. Within its range, the average population of a species rises and falls as the condition and quality of the vegetative cover does or does not favor its own particular requirements. If man undertakes to manage and control wildlife populations, it is plain that he must work through vegetation. The plant species, either separately or in their natural associations are the materials which he must use. These species

and associations, however, cannot be shifted indiscriminately about the face of the earth. Each must be manipulated in its own natural environment. The natural vegetative pattern, therefore, constitutes the framework for the wildlife manager's program and tells him what are the possibilities in any particular area."

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-59. Directions for organizing and conducting rabbit drives, June 1936, 2 pp., 1 diagram.

Cost of destruction in well conducted drives not more than 2 cents per animal. Suggestions as to construction of corrals and management of drives.

BS-61. Sullys Hill National Game Preserve, North Dakota, by Clara Ruth, July 1936, 5 pp., 6 photos.

Location, history, purpose, description; list of Federal big-game preserves.

BS-62. Suggestions on trapping coyotes and wolves in Alaska, by Harlan H. Gubser, August 1936, 6 pp.

Increase and spread of coyote in Alaska; need of control. equipment and directions for trapping; den hunting.

BS-64. Protecting crops from damage by horned larks in California, by Johnson A. Neff, September 1936, 10 pp., 1 diagram.

Nature and extent of damage and outline of methods used to control it.

BS-67. Wildlife technology, by W. L. McAtee, October 1936, 5.pp.

Origin and present status; identity, range, migration, food, and cover techniques; wildlife technology in conservation.

BS-70. Poisonous snakes of the United States, November 1936, 19 pp.

Key to the principal species; poison apparatus and venom; mortality from snakebite; treatment; miscellaneous "snake stories". Bibliography of 45 titles.

BS-71. Wildlife in land planning, by W. L. McAtee, November 1936, 6 pp.

Value of wildlife; results of unfavorable and favorable alterations in environment; allotment of land to wildlife; management in relation to land use; value of wildlife management.

BIOLOGICAL BIBLIOGRAPHIES

American periodicals relating to birds

[Supplement; previous installment in WILDLIFE REVIEW No. 4, pp. 27-29.]

Bird Calendar. Quarterly, mimeographed, 50 cents a year. Cleveland Bird Club, 1505 Rydalmount Road, Cleveland Heights, Ohio.

Bird Notes. Annually, 15 cents a copy. Prof. T. J. McCarthy, State Teachers College, Superior, Wis.

The Chickadee. Semi-annually, $1.00 a year, single copy 50 cents. Forbush Bird Club, 12 State St., Worcester, Mass.

Journal of Minnesota Ornithology. Annually, 50 cents a year. T. S. Roberts Ornithology Club, State Teachers College, St. Cloud, Minn.

Nature Notes of the Webster Groves Nature Study Society. Monthly, mimeographed, 50 cents a year. Mrs. Frederick E. Pfeiffer, 4643 Seibert Ave., St. Louis, Mo.

The Night Heron. Quarterly, $1.00 a year, single copy 25 cents. 1014 Price Road, Clayton, Mo.

The Old Field Lark. Monthly, mimeographed, 75 cents a year, single copy 10 cents. 12910 South Mozart St., Blue Island, Ill.

St. Louis Bird Club Bulletin. Issued 10 times a year, mimeographed, 50 cents a year. 3006 Elliot Ave., St. Louis, Mo.

The Snowy Egret. Semi-annually, mimeographed, $1.00 a year. Pippapass, Ky.

Sporting magazines and conservation department organs

[Supplement; previous installments in WILDLIFE REVIEW, No. 3, pp. 32-34, and No. 4, p. 27.]

Of general scope

Fishing and Hunting Review. Semi-monthly, $1.00 a year, mimeographed. Sports Bulletin Publishing Co., 36 West 44th St., New York, N. Y.

Of local scope

Conservation. Bi-weekly. Iowa State Conservation Commission, Des Moines, Iowa. (A mimeographed clip-sheet.)

Official News Bulletin. Published at irregular intervals. Department of Conservation, Lansing, Mich. (A mimeographed clip-sheet.)

Conservation News. Monthly? No price quoted. Mississippi Game and Fish Commission, Jackson, Miss. Mimeographed.

Montana Fish and Game Notes. Monthly, no price quoted. Montana Fish and Game Commission, Helena, Mont.

Texas Wild Life. Monthly, $1.50 a year. Texas Wild Life Federation, Austin, Tex.

NOTES AND NEWS

I. T. Bode has been appointed wildlife specialist in the Extension Service, U. S. Department of Agriculture, and will cooperate with the Biological Survey and State Extension Services in making available to the States information on wildlife developed by the Survey. The cooperative wildlife research, demonstration, and educational projects that have been supervised by Mr. Bode will be cared for by Dr. H. H. T. Jackson.

The Biological Survey reports that fifty-seven small refuges for migratory waterfowl and water conservation have been established in North Dakota during the past year on more than 90,000 acres of land turned over to the Government through perpetual easements signed by farmers and other landowners.

Five inexpensive and widely applicable measures which conserve the soil and at the same time preserve wildlife, have been tested recently near Harwood, Md., by the Soil Conservation Service. Ernest G. Holt, in charge of wildlife work, says the methods are generally adaptable to all agricultural sections of the country and are particularly successful in preserving such wildlife as rabbits and quail.

The five measures, in general, make use of resources readily available on the average farm, and one or more of the methods will help preserve wildlife on farms in every part of the country, Holt says. The tested measures include:

(1) The planting of mixed grains in protected areas where winter food for game and birds is lacking. These plantings, while helping to control soil erosion, can be easily accessible to wildlife, yet can be placed where they will not interfere with the cropping system.

(2) Soil-binding trees, shrubs, or cover crops are used by farmers to reclaim gullied land and check gully spread. It is an easy matter to include in the erosion-control plantings some shrubs or plants which furnish food for wildlife. There are many such plants, but some of the more widely used are: lespedeza, coralberry, toyon (an evergreen shrub sometimes known as the California holly), blackberry, dogwoods, and viburnums.

(3) Fencing of farm woodlands for protection from grazing also helps to conserve wildlife. Protecting woodland areas from farm livestock permits the growth of forest trees and shrubs which provide food for wildlife. The combi-

nation planting of trees and food-producing shrubs not only supplies food for small game and birds, but also may add to the quality of a forest stand and contributes materially to erosion control. Many farm woodlands are not grazed, but are still in need of stand improvement. In these cases, the Service recommends planting the kinds of trees and shrubs which improve the quality of the stand and which, at the same time, add to the effectiveness of the soil-saving program. Wildlife should not be forgotten when such plantings are made. Open spaces may be purposely left in the woods and allowed to grow to briars and shrubs, in order to supply food for small game and birds.

(4) Whenever it is necessary to clean brush or hedgerows for fencing or woodland improvements, the brush piles may be left as cover for birds, rabbits, and other wildlife. Tree tops and brush neatly piled and left on the ground through the winter furnish welcome cover and shelter for birds and small game. In woodland cuttings, a few snags may be left to provide resting places for nuthatches, chickadees, flickers, woodpeckers and other birds valuable to the farmer.

(5) In farm woodlands of hardwoods, strips and borders of pine and spruce have been planted on many acres this fall. This is particularly true in locust plantations where it is considered that these strips, by shading the trunks of the trees, materially aid in reducing locust borer injury. These strips and borders serve well as wildlife cover areas.

Wherever practical, erosion control workers interested in wildlife also discourage fence-row cleaning, so that vegetative growth along fence rows will be saved for wildlife shelter and food. This practice may find application in many parts of the country, since the activities of birds are likely to more than compensate for any weed or insect pests that may be harbored in fence rows.

The following publication should be called to the attention of wildlife managers: U. S. Department of Agriculture Farmers' Bulletin 1758, Cover crops for soil conservation, by Walter V. Kell and Roland McKee, 14 pp., 11 figs., July (October) 1936. Obtainable from the Superintendent of Documents, Washington, D. C., for 5 cents a copy, stamps not accepted. The principal plants treated are sweetclover, crimson clover, bur-clover, vetches, Austrian winter field peas, kudzu, lespedeza, the cereal grains, redtop and Italian ryegrass.

Announcement has been made by the Post Office Department in Washington, D. C., that rural mail carriers are permitted to assist in feeding birds in snowy weather by distributing grain along their routes whenever they can do so and when grain for the purpose is provided by persons or organizations interested.

A Delaware law provides for payment from a license fee fund for damage done by dogs. In one year, 110 complainants were reimbursed to the extent of $1,435. In addition, under other provisions of the law, 39 claims were settled to the satisfaction of farmers by the owners of dogs that had killed 856 chickens, 90 turkeys, 27 ducks, 6 geese, 10 sheep, and 2 pigs. (Delaware Sportsman, 2(2), October 1936, pp. 5, 11.)

A result of the recent election of interest to readers of WILDLIFE REVIEW was the adoption by Missouri of an amendment to the State Constitution providing for a non-partisan conservation commission. The proposal was adopted by a 3 to 1 majority.

The establishment of a series of fellowships at selected universities, it is announced, will feature the 1937 program of the National Association of Audubon Societies. The Association proposes to contribute $1,500 to cover compensation to the student plus travel expenses, the university to put up the equivalent of $1,000 to $1,500 in services and equipment. The subjects of research to be proposed by the Association will be in the field of natural history as bearing on conservation problems. The first fellowship to be announced is at the University of Arizona for a life history study of the Desert Mountain Sheep.

Fishing and Hunting Review (36 West 44th St., New York, N. Y.) introduces itself as a semi-monthly bulletin service distributing in mimeographed form news items relating exclusively to hunting and fishing. This material is gleaned from 2,000 daily papers and from other sources and is sent to subscribers for $1.00 a year.

By courtesy of the Consular Service, we have seen translations of German ordinances (of 1935) relating to the protection of nature. They are far-reaching and show what can be done where there is great centralized power. In the preface to the general law we are informed that, "The German Government considers it to be its duty to assure even to its poorest citizens their portion of German natural beauties." The ordinances provide for Natural Monuments which are creations of Nature, the preservation of which is in the public interest, and nature reserves or strictly delimited areas in which a special protection of nature is for the public welfare; these may be on either private or public land; there are also preserved regions belonging to the nation or states, that are of major size and importance for nature protection. Administration is by the German Forester General through subordinate officials and committees and there is also a "consultative" service for the detection, scientific investigation, permanent conservation, and supervision of the nature areas, and for promoting a general understanding of the ideals of nature

protection. Land areas which are surrounded by, or border, National Nature Preserves may be expropriated if required. Protection is provided for the environs of reserved areas against the erection of shops, the location of tents, benches, signs, deposition of refuse and other things that might injure their appearance or interfere with their usefulness. Regulations for the protection of plants and non-game animals provide for the destruction of injurious, as well as for the safeguarding of useful, species. The provisions affecting plants are more thoroughgoing than we are accustomed to in the United States. There are lists of wholly protected and partially protected species, and meticulous regulations relating to collecting, sale, or use for industrial purposes. Centuries-old practices in lining, snaring, and trapping birds are prohibited, and the cage-bird business is explicitly defined and restricted. Unprotected species comprise crows, jay, magpie, and the house and tree sparrows (the last two species are the same that have been introduced into the United States), but even in these cases a considerable list of "unfair" means of taking are forbidden. Provision is made for the legal disposal of stray cats at the cost of their owners.

Normally ringneck pheasants are diggers rather than scratchers and it is that propensity which results in damage to beets, carrots, and other root crops including even potatoes. W. J. S. Walker of Calgary, Alberta, informs us that the digging habit was overcome in pen-raised birds by keeping them in coops with bantams and always scattering their feed in a mulch. The pheasant chicks soon learned about scratching from their foster mothers and when released continued to scratch and did not dig.

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The classification used in the index is primarily from the wildlife management point of view, major headings being much the same as have been regularly used in WILDLIFE REVIEW. Subordinate grouping depends usually on the key word, which may be preceded by a preposition, article, or other trivial term. Federal agencies are arranged alphabetically under U. S. Government.

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3	April 1936	95	62	2	2	4
4	June 1936	73	53	2	3	9
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Washington, D. C. No. 8 April, 1937

Classification: Mountain quail

Van Rossem, A. J. A review of the races of the mountain quail, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 39(1), Jan.-Feb. 1937, pp. 20-24, fig. 7 (map).

Divides the living race into 4 subspecies (one described as new); three of them inhabit the Pacific States and the other, Lower California.

Classification: Najas (pondweeds)

Clausen, R. T. Studies in the genus Najas in the northern United States, Rhodora (Museum of Comparative Zoology, Cambridge, Mass., 20 cents a copy), 38(454), Oct. 1936, pp. 333-345, pl. 437, 4 maps.

Key to 5 species; discussion of characters and distribution of the forms, one N. minor first reported from America. These plants sometimes have considerable value as food for wild fowl.

Conservation: Education

Leopold, Aldo, Chairman. The University and conservation of Wisconsin wildlife, Univ. Wis. Bul. (University of Wisconsin, Madison, Wis.) No. 2211, Science Inquiry Publ. III, Feb. 1937, 39 pp., illus.

A well organized and concise committee report on the decline of wildlife and natural vegetation of the State; reaction of the public to abuse of natural resources; and the opportunity presented for research and education. A program of education is recommended for adoption by the State University.

Conservation: Flood control in relation to

Gabrielson, Ira N. Floods and wildlife, Scientific American (24 West 40th St., New York, N. Y., 35 cents a copy), Feb. 1937, pp. 100-102, 6 photos.

Floods are destructive to wildlife as well as to human beings, and flood control helps both. Small dams on headwaters are effective for flood control and also benefit wildlife. Large dams such as those being built in the upper Mississippi impound pools that greatly increase food and other utilities for waterfowl. Similar impoundments on Federal migratory bird refuges also serve the dual purpose of flood control and improvement of the environment for wildlife.

Conservation: Oregon's wildlife resources

Bean, Ormond R, Chairman. Oregon's wildlife resources, State Planning Board (Portland, Oreg.), 126 pp., 4 pls., 9 maps, 5 graphs, 20 tables, 1936. Mimeographed and multigraphed.

Report of an Advisory Committee on Wildlife, W. L. Finley, Chairman, together with recommendations by the State Planning Board. Chapter headings are Importance of the wildlife resource, Management problems of wildlife, Fur bearing animals, Predatory animals, Migratory waterfowl, Upland game birds, Fisheries resources, The pilchard industry, Shellfish, Conservation, Financial support of wildlife, and Wildlife research. A wildlife management plan is incorporated and explained. Statistical information includes report of fish and game taken during 1933 and 1934, and of elk killed in 1934 and 1935; report of fur taken by licensed trappers for the years 1925 to 1932 inclusive, and for 1935; estimate of the number of fur animals on National Forests; game animals killed by hunters and predators on National Forests; predatory animals killed in or near National Forests; waterfowl counts for 1935 and 1936; and upland game birds released from 1925 to 1934, inclusive.

Control: Bounties

Gerstell, Richard. The Pennsylvania system, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(9), Dec. 1936, pp. 3-5, 16, 2 photos, 1 graph; 7(10), Jan. 1937, pp. 8-10, 15, 24, 1 photo, 1 graph; 7(11), Feb. 1937, pp. 2-3, 24, 2 photos, 1 graph.

History of bounty payments dating from 1683; underlying acts twice were repealed on account of fraud; present statute authorized payment from hunting license funds and puts responsibility for administration entirely upon the Game Commission. Method of operating the present system under which bounties can be paid only to holders of hunting licenses. The amount disbursed for bounties in a twenty-year period (1915-1935) was $1,879,100, of which $1,209,500 was for weasels alone. The administrative cost for this period was approximately $180,000. The general trend of the annual cost of the system has been upward, as has the total number of claims and the numbers presented of all animals upon which bounties are still being paid, except the wildcat.

The second installment of the article discusses in some detail bounty payments by species and their effects and concludes that except in the case of the wildcat upon which the bounty has always been highest (at present $15), bounty payment has proved inefficient as a control measure. Bounty payments largely go to persons taking fur in months when it is prime. There is not sufficient correlation of data to show whether the bounty system has been of value as a game protective measure.

The third installment discusses educational features of the bounty system, in bringing citizens in contact with the Game Commission, informing them as to the necessity of predator control, and teaching them to distinguish the goshawk from other hawks; and in providing an abundance of data useful in connection with different researches. The final recommendations are that bounty payments on goshawks and wildcats be immediately discontinued, that bounties on foxes and weasels be reduced or possibly discontinued, and that the Board of Game Commissioners be given full control of the bounty system in every detail. An editorial note at the end states that the material printed in the Game News represents a part of the findings incorporated in an illustrated bulletin shortly to be issued by the Commission.

Control: Eagles

Dale, Frederick H. Eagle "control" in northern California, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 38(5), Sept.-Oct. 1936, pp. 208-210.

Reason advanced, killing of lambs; method, shooting from airplanes; result, 200 eagles killed in the neighborhood of Red Bluff in one winter and spring. Benefits to the stockman from the consumption of range pests by eagles are cited. Author's conclusion: "Golden Eagles are highly beneficial to agriculture in the sum-total of their activities and should not be destroyed as a species, although occasional individuals may require destruction because of lamb-killing habits. Control should be limited to the areas where these birds are known to be killing lambs. Bald Eagles have not been found guilty as yet of killing lambs and their slaughter represents a poor investment by the sheep-owner."

Control: Field mice

Silver, James. Orchard mouse control, The Mountaineer Grower (Martinsburg, W. Va.), 7(78), Oct. 1936, pp. 3-6.

Field mice populations fluctuate and are apparently approaching a peak in the Shenandoah Valley. Damage is serious and control methods not entirely satisfactory. Mice develop a certain resistance to strychnine and baits, to be effective, must be distributed with due regard to time and place. A formula using steam-crushed whole oats is recommended and directions given for its use. An apple bait also is described.

Control: Fish predators

James, M. C. Stocking interior waters of the United States, U. S. Bureau of Fisheries, Fishery Circ. (Supt. of Documents, Washington, D. C., 5 cents a copy) 8 (rev.), 18 pp., 7 figs., Sept. 1936.

Predators are discussed on pages 15-16 but only destructive methods of control are considered. This is contrary to wildlife management on sound biological lines. Preventive measures not involving the death of predators are known and should be used. Those relating to birds are described in U. S. Dept. Agr. Leaflet 120, Excluding Birds from Reservoirs and Fishponds, 1936.

Control: Vermin

Trembley, F. T. Just what is vermin, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(10), Jan. 1937, pp. 4-5, 23, 4 photos, 2 drawings.

"Vermin" has been defined as "any animal that preys upon other animals of greater worth to man." The difficulty is in truly appraising worth and it is becoming evident that the net results of "vermin" persecution are almost the exact opposite of those it is intended to accomplish. Complex and little understood inter-relations of wildlife indicate the need of discretion in killing. The author prefers the definition of "vermin" as an animal out of place, just as a plant out of place is regarded as a weed.

Control: Vermin, the effects of

Morrison, Kenneth D. Rats, grasshoppers, and man, Minnesota Conservationist (Dept. of Conservation, St. Paul, Minn., 15 cents a copy), 42, Feb. 1937, pp. 18-20, 3 photos.

Comment on occupation of the land and drainage in relation to wildlife, but especially on vermin control. "If we continue devastating nature and applying countless panaceas according to the whims of every loud-mouthed exponent of 'Kill this' and 'Kill that' slogans that masquerade under the guise of conservation, we will soon have a natural fauna that will consist of little more than Rats, Grasshoppers, and Man."

Control: Vermin problem

Lay, George B. The importance of rodent control in game management, Georgia Sportsman (State Dept. of Game and Fish, Atlanta, Ga., 10 cents a copy, 1(1), Nov. 1936.

Rodents compete with quail for food and ordinarily their natural enemies should not be interfered with. Exceptions concern Cooper's and Sharp-shinned hawks generally, other species occasionally and individually, and areas where game is being propagated for stocking purposes or for sale. Pole traps should not be used. Feral cats and dogs should be eliminated.

Control: Vertebrates in insect control

Sweetman, Harvey L. The biological control of insects (Comstock Publishing Co., Ithaca, N. Y., $3.75 a copy), 461 pp., 142 figs., tables.

Chapter XII, pp. 318-339, figs. 130-134, entitled "The use of predatory vertebrate animals", contains information on the food habits of animals of the various phyla, and examples of the actual utilization in practical control of fishes in relation to mosquitoes, and of the giant toad as a consumer of sugar cane insects.

Control: Wolf bounties

Cross, E. C. Wolf! Wolf!, Rod and Gun in Canada (1224 St. Catherine St., West, Montreal, Canada, 10 cents a copy), 38(8), Jan. 1937, pp. 18-19, 32-33, 4 figs.

Both timber and brush wolves (coyotes) are common in Ontario. The latter have increased rapidly in recent times and exhibit distinct 10-11 year fluctuations in numbers. During the last ten years some 33,000 wolves were destroyed at a cost for bounties of half a million dollars. There is no evidence of any reduction in the timber wolf population and the brush wolves have increased. The total wolf population is actually greater at the present time than it was ten years ago despite the amount spent in wolf destruction. The effect has been to kill off a surplus thus making things easier for the survivors. Had no bounties been paid during the last twenty years, probably there would have been no material difference in the wolf population today. "The premise on which bounty payments and campaigns for predator control have been based, is that if there were fewer predators there would be more game." However, deer greatly increased both in number and in range in Ontario at the same time that the wolves were increasing. The author comments that "numbers are controlled by a complex of factors, of which the predator is but one and by no means the most important." "If the money spent in 'wolf control' were to be used in finding out what our natural resources in fur and game need, and meeting that need, it would return dividends instead of deficits."

Cycles

Davis, David E. A cycle in northern shrike emigrations, The Auk (3200 22nd St. N., Arlington, Va., $1.00 a copy), 54(1), Jan. 1937, pp. 43-49.

Data chiefly from Christmas censuses in Bird-Lore indicate that the northern shrike emigrates periodically, the periods averaging 4.2 years. Discussion of cyclic occurrence of other birds and of mammals. Bibliography of 15 titles.

Cycles: Snowshoe hare

Green, R. G. Present status of the snowshoe hare cycle investigation (Dr. R. G. Green, University of Minnesota, Minneapolis, Minn.), 3 pp., Jan. 1937, mimeographed.

Apparently shock disease is the actual killing mechanism which causes the die-off. Its prevalence and symptoms are discussed; abundance of ticks seems to be an essential associated condition. Plans for an experiment to yield more definite information.

Destruction

Snyder, L. L. Vanished and vanishing birds, Hunting and Fishing in Canada (428 University Tower, Montreal, Canada, 15 cents a copy), 3(1), Jan. 1937, pp. 8-9, 18, 23, 4 drawings by T. M. Shortt.

Brief accounts of extinct species: Great auk, Labrador duck, Carolina paroquet, passenger pigeon. To be continued.

Destruction: Game birds by severe winter

Green, William E., and Watson E. Beed. Iowa quail and pheasants in winter, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 25(6), Nov.-Dec. 1936, pp. 83-84, 90-92, 4 photos.

February 1936 was the coldest of 117 Februaries on record for Iowa and there was heavy snow and strong, cold winds; 187 pheasants found dead were examined, and they were well fed. "It was evident that death was not due either to lack of food or to lack of cover alone, but that mortality was directly proportional to the distance of food from good protective cover." There was a mortality of 250 or 62.5 percent of 400 birds on an observation area. 131 (32.75 percent) either froze or choked to death; 37 (9.25 percent) were found snowed under; 13 (3.25 percent) showed evidences of pneumonia; 12 (3 percent) were illegally shot; one bird was starved and one killed by a predator, probably a hawk. The sex ratio of survivors was about three hens to one cock. The effect of the severe conditions upon quail differed, apparently as a result of greater deprivation of cover. Losses to predators, chiefly Cooper's hawk, amounted to 14.5 percent; and to cold and hunger, chiefly the former, 40.5 percent.

Destruction: Quail by severe winter

Scott, Thos. G. Snow-killing of the bob-white, Wilson Bulletin (Dr. T. C. Stephens, Morningside College, Sioux City, Iowa, 60 cents a copy), 49(1), March 1937, pp. 21-27, figs. 2-4, 1 table.

The severe weather of the late winter of 1936 in Iowa (see also preceding abstract) resulted in death by snow imprisonment of quail, an instance of which is described and illustrated. Conclusions are: that reasonably healthy bobwhites may perish through exposure to strong cold winds and snow, as well as by imprisonment; that cover, subject to drifting, is not ideal; and that research into management practices should include study of the effect and control of drifting snow.

Disease: Bighorn sheep

Potts, Merlin K. Hemorrhagic septicemia in the bighorn of Rocky Mountain National Park, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 18(1), Feb. 1937, pp. 105-106.

Identified from a single sheep that was found dead; discussion of import of the disease to the species.

Disease: Eelgrass

Renn, Charles E. Persistence of the eel-grass disease and parasite on the American Atlantic Coast, Nature (Macmillan & Co., Ltd., St. Martin's St., London, W. C. 2, England, 1 shilling a copy), 138(3490), Sept. 19, 1936, pp. 507-508.

Despite promising spring growth in some areas, the parasite flourishes and the wasting disease persists. The author's conclusion is: "If previous experience may be taken as an indication, the following seasonal sequence may be expected: Very slow winter growth of the Zostera with the Labyrinthula passive in the leaves (the spindle form of the parasite has been found in winter specimens), rapid vegetative development in the late spring, with slight increase in activity of the Labyrinthula, diminution in the vitality of the plant prior to seed formation in the early summer with sudden activation of the parasite, destruction of leaves, development of new leaf shoots and their subsequent destruction (repeated several times in mid-summer), and final exhaustion of a portion of the stem stock and dying back of part of the bed developed earlier. A number of plants will seed prematurely, or will appear to because more retarded members die off before the normal fruiting period is finished. Barring the development of resistent strains of Zostera or general attenuation of the parasite, this seems to be the probable cycle within any progressive return of the plant. This, I realize, is not a cheerful interpretation, but it will be recognized that readjustments no less drastic, but easily overlooked, occur constantly."

Disease: Rabbit papillomatosis

Larson, C. L., J. E. Shillinger, and R. G. Green. Transmission of rabbit papillomatosis by the rabbit tick, Haemaphysalis leporis-palustris, Proc. Soc. Exp. Biol. Med. (Griffiths Press, 100 Liberty St., Utica, N. Y., 75 cents a copy), 33(4), Jan. 1936, pp. 536-538.

The disease is accompanied by the so-called rabbit horns. It is caused by a filtrable virus which was experimentally proved to be mechanically transmissible by the rabbit tick. The authors suggest that the infection may likewise be transferred by mosquitoes and other biting flies.

Disease: Roup

Quortrup, E. R. Roup, its causes and treatment, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 25 cents a copy), 40(10), Oct. 1936, pp. 213, 220-221.

Symptoms; occurs chiefly in immature and is associated with exposure and sudden changes in temperature; preventive measures; treatment.

Disease: Salmonella in quail

Edwards, Philip R. The occurrence of Salmonella, Oranienburg type, in an infection of quail, Journ. Bacteriology (Williams and Wilkins Co., Baltimore, Md.), 32(3), Sept. 1936, pp. 259-263, 1 table.

The identification of this organism from quail chicks in Kentucky constitutes the first report of the presence of this bacillus in America and also the first record of the appearance of this type of bacterium in diseases of animals.

Ecology

Saunders, Aretas A. Ecology of the birds of Quaker Run Valley, Allegany State Park, New York, New York State Museum Handbook (Albany, N. Y.), 16, 174 pp. (5 x 7-1/2), 68 figs. (photos, maps), tables, 1936 (1937).

General discussion of ecological principles as related to this report. List of 141 species of breeding birds. Method of estimating the population was counting of singing males in strips bisected by a paced line, each 175 double paces of which traversed an area of 10 acres. The birds are discussed by habitats, and the information summarized in a table. The most numerous species were, black-throated green warbler, red-eyed vireo, and ovenbird. The habitat having the largest number of pairs of birds was the young maple-beech-hemlock association. The number of pairs per 100 acres was greatest (182.1) in mature maple-beech-hemlock growth. The average number of pairs per 100 acres for the whole area (nearly 17,000 acres) was 84.6.

The effects of succession on the bird population are discussed and one of the conclusions appears different from that usually drawn by naturalists. That is, "as the forest grows the numbers of breeding birds will increase in proportion to the height of the forest crown." The conflict is only apparent, however, as closure of the crown is stated to be accompanied by disappearance of ground vegetation and of certain species of birds. As the forest matures, more light reaches the ground, undergrowth returns, and the variety of birds increases. The period of dearth naturally is shorter in deciduous and mixed woodland than it is in pure coniferous stands. Thirty pages are devoted to an account of the ecology of the ruby-throated hummingbird.

Ecology: Animals in relation to soil and water

Holt, Ernest G. Wildlife in soil and water conservation, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 25(6), Nov.-Dec. 1936, p. 86, 2 photos.

Animals play a tremenduous part in the conservation of soil and water resources and their function and rights must be considered in allocations of these basic resources.

Ecology: Animal populations of grasslands

Wolcott, George N. An animal census of two pastures and a meadow in northern New York, Ecological Monographs (Duke University Press, Durham, N. C., $1.50 a copy), 7(1), Jan. 1937, pp. 1-90, 45 tables.

Relates mostly to invertebrates. "it was found that where there were few cows in the pasture, they scarcely equalled in weight the total of the wild life present there, and the insects ate more of the grasses and clovers than the cows did." Percentage by bulk of food items of robins in Illinois

bore a roughly proportional relationship to percentages by their weights in the New York pastures. The robin preys very effectively upon some groups and where numerous reduces the population of these insects below those of less preferred areas.

Ecology: Carrying capacity, ruffed grouse

Errington, Paul L. Winter carrying capacity of marginal ruffed grouse environment in north-central United States, Canadian Field Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 51(3), March 1937, pp. 31-34, 1 table.

In territory marginal for the species carrying capacity appears to be rather definite and the author's previous findings for bobwhite that populations within carrying capacity are secure, those exceeding it, insecure, are paralleled. They are not given general application because of apparently conflicting results of other investigators.

Ecology: Clean-up work

Murie, Olaus J. Down logs, Atlantic Monthly (10 Ferry St., Concord, N. H., 40 cents a copy), 158(5), Nov. 1936, pp. 596-599.

An effective protest in literary form against the spoiling of wildlife environment and desecration of wilderness areas.

Ecology: Deer in Ontario

Cross, Ewart C. The white-tailed deer of Ontario, Rod and Gun in Canada (1224 St. Catherine St., West, Montreal, Canada, 10 cents a copy), 38(9), Feb. 1937, pp. 14-15, 32, 2 maps.

Settling of the country forced deer out of fertile range onto lands submarginal for the animals as well as for agriculture. These areas have one advantage in that the thinner populations they support do not offer good opportunity for diseases. Limiting effect of availability of winter browse. Relations of wolves and wolf bounties more fully discussed in another article. (See page 5.) Need of full information and skilled wildlife management to make the best of the situation.

Ecology: Niobrara Game Preserve

Beed, Watson E. A preliminary study of the animal ecology of the Niobrara Game Preserve, Conservation Dept. (Univ. of Nebraska, Lincoln), 10, 33 pp., 3 figs., tables, Oct. 1936.

Description of the area, its meteorology, vegetation, and animals. The terrestrial vertebrates are discussed by classes, and lists of them presented for the various ecological associations.

Ecology: Photoperiodism

Bissonnette, Thomas H. Sexual photoperiodicity, Quarterly Review of Biology (Williams & Wilkins Co., Baltimore, Md., $1.50 a copy), 11(4), Dec. 1936, pp. 372-386.

Review of the subject for both plants and animals; discussion of experiments; present state of knowledge. Notes on animals wild in this country pertain to crow, junco, starling, and 13-lined ground squirrel. 127 references to literature.

Ecology: Populations

Bureau of Animal Populations (Oxford University, England), Annual Report 1935-36, 48 pp., 1937.

History of the Bureau (Charles Elton, Director); statement of its support; summary of researches on populations of voles, rabbits, hares, partridges and grouse; report on North American enquiries particularly as to cyclic fluctuations of the snowshoe hare and other northern species; on special surveys; and on animals introduced into Great Britain, including the North American muskrat and gray squirrel. There is a list of publications by members of the staff in 1935-36 and a bibliography of 102 titles of recent literature on animal populations.

Ecology: Populations, European partridge

Middleton, A. D. The population of partridges (Perdix perdix) in Great Britain during 1935, Journ. Animal Ecol. (Cambridge University Press, Fetter Lane, London, E. C. 4, England), 5(2), Nov. 1936, pp. 252-261, 4 figs., 6 tables.

Author's summary: "In 1935 the partridge population of most parts of Great Britain showed a further increase. The nesting stock was greater than in 1934, in some areas, e.g. Norfolk, apparently approaching a maximum. A third favourable summer for survival of young, similar to those of 1933 and 1934, resulted in a high autumn density, the numbers killed in 1935 being 9% greater than in 1934 and 64% greater than in 1933."

Ecology: Populations, house wren

Kendeigh, S. Charles, and S. Prentiss Baldwin. Factors affecting yearly abundance of passerine birds, Ecological Monographs (Duke University Press, Durham, N. C., $1.50 a copy), 7(1), Jan. 1937, pp. 91-123, 8 tables.

Another contribution from 14 years study of the house wren. On an area of approximately 15 acres the following yearly averages were obtained: number of adults, 19.7; sex ratio 109.6 males:100 females; number of broods during first and second breeding periods, 7.8, 6.0; broods per female, 1.5; percentage increase in number of birds during breeding season, 284; and

percentage annual mortality, 72.8. The factors affecting yearly mortality are largely meteorologic. There is a considerable non-breeding population composed principally of immature birds. Adults seem to return to same localities to nest; in the immature there is a tendency to dispersal.

Ecology: Sampling insect populations

Carpenter, J. Richard. Quantitative community studies of land animals, Journ. Animal Ecology (Cambridge University Press, Fetter Lane, E. C. 4, London, England), 5(2), Nov. 1936, pp. 231-245, 1 fig., 2 tables.

Bearing principally on the sweep net method (previously referred to in WILDLIFE REVIEW, No. 1, Sept. 1935, p. 32, and No. 7, Dec. 1936, p. 14) which is approved as being sufficiently accurate, this contribution embraces discussion and a bibliography (58 titles) of considerably wider scope. The remarks upon daily, seasonal, and annual fluctuations in the numbers of animals active in communities are of interest.

Ecology: Stand improvement

Barret, Leonard I., W. C. Branch, and P. F. W. Prater, Committee. Current stand improvement practices and policies in the southern Appalachian region, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(8), Aug. 1936, pp. 771-774.

Relates essentially to work done by the C.C.C. Silvicultural methods are tempered by a variety of public interests, among which the Committee reports a satisfactory compromise has, in general, been reached. Some of the criticism in the past has been justified, including that relating to game food values being reduced beyond reasonable necessity. The Committee classifies the principal plants concerned into four groups, one of which Special-Use and Game-Food Species includes: dogwood, holly, black gum, chinquapin, umbrella magnolia, fire cherry, Crataegus, persimmon, and sumac. With special reference to these shrubs and trees, the Committee reports: "Our figures indicate that next to the species of highest timber value the special-use and game-food group are removed to a lesser extent than are the remaining two species groups." To the wildlife specialist this is not a very satisfactory finding, however, as among the plants excluded from this list, and according to the report more frequently eliminated in stand improvement work, are 5 species of oaks, all hickories, red maple, 2 species of pine, black birch, butternut, beech, blue beech, ironwood, sassafras, and balsam, all of which are of equal value to wildlife with species included in the special-use list. The findings therefore depend upon the definitions of the groups, and if a wildlife proponent had made them, the results of the investigation could not have been couched in such palliatory terms.

Economics: House rat

Silver, James. The house rat, U. S. Dept. Agr. Circ. (Supt. of Documents, Washington, D. C., 5 cents a copy), 423, 18 pp., 15 figs., Jan. 1937 (March).

General account of the brown rat in the United States with special reference to its destructiveness. Discussion of its introduction and spread, habits, abundance, economic status, and relation to public health.

Economics: Value of Alaskan wildlife

Troy, John W. Annual Report of the Governor of Alaska (Supt. of Documents, Washington, D. C., 10 cents a copy), 1936, 44 pp.

"The value of Alaska's resources of game and fur is conservatively estimated on a meat and pelt value of more than $93,000,000. The yearly monetary returns to the residents of the Territory are in excess of $4,000,000. The value of furs shipped from Alaska during 1935 was $1,416,037.65."

Education: Wildlife management in North Dakota

Fox, Adrian C. What can be done to improve the environment for wildlife?, Soil Conservation Service (North Dakota Project No. 1, Park River, N. D.), 20 pp., 1937, mimeographed.

Consists chiefly of 118 questions and answers for use in a night school established by the Soil Conservation Service and North Dakota Extension Service, cooperating. Sample subjects receiving most attention are cover, erosion control, feed patches, feeding stations, predators, refuges, and work of the Soil Conservation Service.

Food Habits: Deer browse

Howard, William J. Notes on winter foods of Michigan deer, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 18(1), Feb. 1937, pp. 77-80.

Observations in Emmet County during the winter of 1934-1935 indicate the most important browse plants to be: white cedar, common juniper, red-osier dogwood, aspen, withe-rod, and sumac. Notes are given on less utilized species also, and the browse situation is described as becoming critical.

Food Habits: Fish-eating birds

Langlois, T. H. A study of the small-mouth bass Micropterus dolomieu (Lacepede) in rearing ponds in Ohio, Ohio Biol. Survey Bul. (Division of Conservation, Columbus, Ohio), 4(4), [33], pp. 191-225, 13 figs., 5 tables, Oct. 1936.

Brief statement of stomach contents of 14 kingfishers, 4 great blue herons, and 20 little green herons, shot at one State fish farm in July 1933. The propagated fishes, bass, were found in only one of the 14 stomachs of the kingfishers examined and in 9 of the 20 green herons. Tabulation of birds killed at twelve fish farms in 1932 (513 of 10 species), and in 1934 (445 of 8 species). In both years the preponderant species were kingfishers and little

green herons. Comment: A method of protecting the fish other than killing the birds would seem desirable and more in harmony with general conservation ideals.

Food Habits: Fur seal

May, Franklin H. The food of the fur seal, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 18(1), Feb. 1937, pp. 99-100, table.

Of 113 stomachs from Washington and Alaskan waters, only 39 contained food, the predominating element of which was herring; traces of squid, crustaceans, and vegetable matter also were present.

Food Habits: Pheasant

Gigstead, Gilbert. Habits of Wisconsin pheasants, Wilson Bulletin (Dr. T. C. Stephens, Morningside College, Sioux City, Iowa, 60 cents a copy), 49(1), March 1937, pp. 28-34.

The hardiness and general adaptability of the pheasant as a sporting bird are commented upon. Agricultural districts containing marshes providing cover are the best pheasant range in Wisconsin. Investigation of damage to corn plantings showed the pheasants involved but not as destructive as ground and tree squirrels and domestic pigeons. However corn is eaten at all seasons and composes about a third of the pheasant's fall and winter diet. A farm population of 25 pheasants will consume in a winter some 240 pounds of corn worth about $3.60. With sale of hunting privileges, permitting the shooting of one-third of the 25 birds would net the farmer at least twice the price of the 240 pounds of corn. The best plants for feed patches are yellow kaffir corn and wheatland milo maize. Information is given in text and table on analysis of the contents of 141 crops collected in August, October, November, December, and January. Corn was a leading item in all months. Important supplements in August were oats and grasshoppers; in October, ragweed, yellow foxtail, and grasshoppers; in November, ragweed; in December, Spanish-needle and poison sumac; and in January, poison sumac.

Food Habits: Rabbit damage

Wood, O. M. Early survival of some pine interplantings in southern New Jersey, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(9), Sept. 1936, pp. 873-878, 1 fig., 2 tables.

Most of the damage occurred the first winter after planting and it resulted in total loss of 20 or more percent, and damage to an additional proportion of certain species of pine seedlings. For all species and plantings together, 8 percent were killed, and an additional 8 percent injured.

Food Habits: Red fox

Errington, Paul L. Food habits of Iowa red foxes during a drought summer, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 18(1), Jan. 1937, pp. 53-61, 3 tables.

Author's summary: "Comparisons were made of the food habits of red foxes in Iowa during the drought season of 1934 and the 'normal' season of 1933. The data were obtained from the examination of 1,010 food items and 1,175 fecal samples from 113 breeding dens in 1933 and 2,848 food items and 935 fecal samples from 200 dens in 1934.

"From this material, the conclusions may be drawn that, of the chief types of food, the representation of rabbits, ground squirrels, passerine birds, and ring-necked pheasants was nearly the same in 1934 as in 1933; that the representation of mice dropped appreciably in 1934, coincident with a rise in representation of pocket gophers, domestic chickens, and insects (mainly such Coleoptera as Phyllophaga).

"The increase in representation of insects in fox diet was especially pronounced.

"On the basis of contemporaneous data from population studies of certain prey species and studies of the food habits of predators other than foxes, it would appear that the adverse effects of the drought upon the general habitat of prey species was followed by increased vulnerability of most of the latter, only some were rendered more vulnerable than others, and were accordingly preyed upon the more."

Food Habits: Red fox

Errington, Paul L. Food habits of the red fox in Iowa, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 26(1), Jan.-Feb. 1937, pp. 5-6, 13, 1 photo.

Report on field work, and on analyses of stomach contents, feces, and material collected at dens. Mice and rabbits are staple foods, but a great variety of other creatures are taken, usually in proportion to their availability. Many of these articles of diet are listed and a general discussion of predation is included.

Food Habits: Red fox

Murie, Adolph. Following fox trails, Univ. of Michigan Misc. Publ. (Univ. Mich. Press, Ann Arbor, Mich.), 32, 45 pp., 6 pls., 7 figs., 1 table, Aug. 1936.

A study of the food habits of foxes in Michigan by trailing when snow was present and by analysis of droppings. The leading food item was cottontail rabbits; next were lemming-voles (Synaptomys), meadow-mice, and insects.

Availability largely controls choice of food. The habit of storing surplus catches was marked; the caches are robbed by the skunk, crow, and marsh hawk. Shrews and moles are not relished for food but nevertheless are killed when opportunity occurs. Heavy fox depredations do not prevent the rabbit population from flourishing. Like most wild creatures, the fox does both good and harm so far as the economic interests of man are concerned. From the purely economic point of view, it would seem best to permit the fox to exist in fair numbers, controlled primarily by hunting and trapping. "If our out-of-doors is to be managed on broad lines so that the various interests both economic and aesthetic are considered, and not for the special benefit of small minority groups, then the fox should be permitted to occupy its rightful niche in the woods and fields."

Food Habits: Rodent browse

Siegler, Hilbert R. Winter rodent damage to game cover, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 18(1), Feb. 1937, pp. 57-61, 2 tables.

Upon the basis of observations in Jefferson County, Wisconsin, during the severe winter of 1935-1936, it is concluded, that mice did more damage than rabbits but that the latter attacked a greater variety of plants; that cut brush serves to protect standing growths; and that there are differences in palatability within food species probably due to chemical composition. A complete list is given of plants found damaged. The favorites of the rabbit are: smooth sumac, blackberry, raspberry, oak, wild black cherry, and rose; of the mice, wild black cherry, wild plum, gooseberry, oak, blackberry, and apple. Among plants little used and therefore preferable for food plantings are: red cedar, creeping juniper, poplars, elder, hazel, dogwoods, swamp birch, Virginia creeper, frost grape, and honeysuckles. Bibliography of 6 titles.

Food Habits: Trees and shrubs producing food for wildlife

Viehmeyer, Glenn. Trees and shrubs of value as a source of food for birds in the Sandhill Region of Nebraska, The Nebraska Bird Review (1410 North 37th St., Lincoln, Nebr., 25 cents a copy), 5(1), Jan. 1937, pp. 3-5.

Comment based largely on the writer's observations on the following 18 species of trees and shrubs: eastern red cedar, hackberry, Russian mulberry, wild gooseberry, wild black currant, wild golden currant, prairie rose, prickly rose, wild plum, western choke cherry, smooth sumac, ill-scented sumac, western snowberry, bittersweet, wild grape, Virginia creeper, Russian olive, and green ash. Notes on value for cover also are included.

Introduction: Red grouse

Ward, J. D. U. Red grouse as pets and colonists, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 25 cents a copy), 40(12), Dec. 1936, p. 259.

Hand-reared stock accustomed to special food was used to colonize the species in New Zealand. Speculation as to the chance of similar success in the United States.

Life Histories: Beaver

Soper, J. Dewey. Notes on the beavers of Wood Buffalo Park, Alberta, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 18(1), Feb. 1937, pp. 1-13, 2 pls., 2 figs.

Aspen is the principal food tree; next in order of choice, or availability, are white birch, balsam poplar, willows, and alders, and rarely conifers, as white spruce. Notes on dams and lodges, and on value in stabilizing water levels. Trapping methods described and illustrated. Beaver have increased under protection so that there are about 15,000 present; total carrying capacity of the area from 75,000 to 100,000.

Life Histories: Chukar partridge

Rolph, James, III. Who is he - this Mr. Chukor, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 25 cents a copy), Part I, 40(10), Oct. 1936, pp. 207, 222-223, 1 photo; Part II, 40(12), Dec. 1936, pp. 249-261.

Compiled information relative to color and other characters, geographical distribution, introduction into the United States, cover requirements, social organization, food, breeding and nesting habits, eggs, sporting qualities, and enemies in Part I. In Part II is discussion of the chukar on the game farm, with reference to sanitation, mating, and care of breeders and eggs.

Life Histories: Roosevelt elk

Orr, Robert T. Notes on the life history of the Roosevelt elk in California, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 18(1), Feb. 1937, pp. 62-66.

The present restricted range is principally forest land; important food plants are sword fern, deer fern, bilberry, huckleberry, salal, salmon berry, wild lilac, willows, and grasses; some damage is done to corn and barley; notes are given on trails and beds; the animals are not numerous and are in need of additional protection to save them from extermination in the State.

Life Histories: Sage grouse

Girard, George L. Old Tom, the sage cock, issues a challenge to action, Outdoor America (1167 Merchandise Mart, Chicago, Ill., 10 cents a copy), N. S. 1(11), Sept. 1936, pp. 4-5, 9, 5 photos.

Excerpts from thesis based on the author's well known research on this bird, relative to nesting habits, flying and walking speeds, enemies, grazing competition, and food, together with suggestions for establishment of refuges, restriction of shooting privileges, and education as to the needs of sage grouse and ways of meeting them.

Life Histories: Snowshoe hare

Aldous, C. M. Notes on the life history of the snowshoe hare, Journ. Mammalogy (Wm. H. Burt, University of Michigan, Ann Arbor, Mich., $1.00 a copy), 18(1), Feb. 1937, pp. 46-57, 1 pl., 1 fig. (graph), 2 tables.

Principal results from studies in Minnesota, 1932-1935. Notes on longevity (few if any attain 8 years); sex ratio (54 percent males); breeding season (March-August) and rate of breeding (probably 2-3 times per year); size of litter (average 2.4 young); parental care of young (none after weaning); nests and forms; physical characteristics in the breeding season; dusting places; pelage changes; migrations (territory normally limited to a few acres, no definite migration observed); retrap tendencies; and homing instinct. Bibliography of 8 titles.

Life Histories: White-tailed deer

Atwood, Earl L., Jr., and Julian A. Steyermark. The white-tailed deer in Missouri, Clark National Forest (St. Louis, Mo.), 34 pp., 9 figs., 1937, mimeographed.

Observations on the food of deer transported from Minnesota to fenced areas in Missouri. Seasonal food plants listed by species. Nearly half of the State should be deer range but the animals have been hunted out until only a few hundred survive. Out-of-season hunting and illegal killing of does in season are destructive factors, more so than predators, of which dogs are ranked ahead of wolves and wildcats. Notes on habits.

Management: Bobwhite

Stoddard, Herbert L. Fifth Annual Report Cooperative Quail Study Association (Thomasville, Ga.), 1935-36, 23 pp., Oct. 1936.

Among the topics of general interest that are treated are: the use of fire in cover control, cover development, and experimental work with game food plants. Some of the plants commented upon are sesbania, sericea lespedeza, little black cowpea, trailing wild bean, Texas millet, fall grains, and a row-planting feed patch combination. There is a report of progress on the

fire ant work, and sections on "red quail" experiments, planting for doves, wild turkey studies, and investigations of mammals in relation to game and wildlife (this last topic the special care of E. V. Komarek).

Management: Bobwhite cover

Stoddard, Herbert L. Bobwhite quail and their preferred cover, Outdoor Florida (1306 Grand Central Ave., Tampa, Fla., 10 cents a copy), 1(9), Nov. 1936, pp. 11-12, 1 photo.

Value of the bobwhite; leasing of shooting rights for from 5 to 20 cents per acre; environmental improvement superior to, and more economical than, restocking; desirable and undesirable types and qualities of cover, their interspersion and management; controlled burning. "Quail can be produced by simple measures in any desired numbers where sufficient feed and cover is provided and indulgence in quail shooting is in proportion to production."

Management: Cottontail

Anon. How to improve rabbit habitat, Ohio Outdoor News (210 N. Court St., Circleville, Ohio, 5 cents a copy), 2(6), Dec. 1936, p. 2.

Use of old fence wire; rail, rock, and slab piles; brush heaps; tile and nail kegs for cover; clover and rape for food.

Management: Cottontail

Gerstell, Richard. Management of the cottontail rabbit in Pennsylvania, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(12), March 1937, pp. 6-7, 27, 30, 5 photos; 8(1), April 1937, pp. 15-19, 3 photos, 2 graphs.

Part 1. Differences in habits of subspecies and of sexes; the females apparently hole-up far more than the males. The sex ratio of rabbits imported from Kansas and Missouri was approximately even. The importation policy has prevailed since 1915 and animals have been obtained from a number of States, over 90 percent of them, however, from Kansas and Missouri. In twenty years (1916-36) more than 700,000 rabbits were purchased at a cost (including shipping charges) of about one dollar each. Transportation mortality varies from 3 to 7 percent and there are apparently considerable losses shortly after liberation.

Part 2. Despite restocking, "the fall rabbit population varies annually according to certain limiting factors, such as winter losses and breeding season conditions"; "the general population tendency during the past has been toward a generalized reduction in density"; "general rabbit conditions have become gradually worse for a period of approximately fifteen years," and are now acute. Steady reduction in numbers may obscure fluctuations in the rabbit population but "it is important to note that 1918, 1928, and 1936, 'low' years in the grouse cycle in Pennsylvania, were also 'poor' cottontail rabbit seasons."

There is "no direct relationship between the number of cottontails released during a given winter and the number of animals legally shot the following fall" and it may well be said that the result of Pennsylvania's rabbit restocking program has been largely psychological. The spread of clean farming and hunting pressure are the main factors responsible for the decline of the rabbit population. Forest growth on abandoned farms reducing rabbit habitat, killing by automobiles, predation, unskilful and illegal trapping are additional limiting factors. Other articles to follow.

Management: Cottontail

Stuber, James W. Ohio rabbit propagation now in vogue, Ohio Outdoor News (210 N. Court St., Circleville, Ohio, 5 cents a copy), 2(6), Dec. 1936, pp. 6, 8.

Encouragement of rabbit propagation in the wild by establishment of rabbit producing areas in cooperation with farmers and sportsmen's organizations. The average cost was from $10 to $12 per area. Brief account of life history, and full treatment of food and cover of the native cottontail. Planting of sweet corn, rape and other things to improve habitat. Artificial cover facilities are suggested, and enemies and other causes of loss discussed.

Management: Demonstration in Michigan

Anon. The Allegan Project, Michigan Conservationist (State Dept. of Conservation, Lansing, Mich.), 6(6), Nov.-Dec. 1936, pp. 7-8, 3 photos.

A tract of 44,000 acres in Allegan County, Mich., acquired by the Federal Resettlement Administration is being managed for wildlife. Account of the work accomplished and of plans for the future.

Management: Farmer-sportsman relationship

Biddle, Nicholas. Regulated shooting areas, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(10), Jan. 1937, p. 16, 1 photo.

Results of an inspection trip to regulated shooting areas in Connecticut and both public hunting grounds and regulated areas in New Jersey.

Management: Farmer-sportsman relationship

Conklin, W. Gard. Chester County farm game project successful, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(10), Jan. 1937, p. 17, 3 photos.

Report on first season's operation of one of the cooperative farm game projects noticed in WILDLIFE REVIEW, No. 7, December 1936, p. 25. Considered a success.

Management: Farmer-sportsman relationship

Conklin, W. Gard. An analysis of the farm game program, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(12), March 1937, pp. 8-11, 31, 4 photos, 1 map, 1 table.

Statement of the problem and how Pennsylvania is endeavoring to solve it. Description of the farm game refuge project; its operation and success; and finances.

Management: Farmer-sportsman relationship

Hicks, Lawrence E. The controlled hunting areas and the pheasant refuge management system in northwestern Ohio, Ohio Wildlife Research Sta. (Ohio State University, Columbus), Release No. 23, 8 pp., mimeographed.

One of the most constructive contributions to this vexed problem that has yet appeared. Ohio has certainly solved pheasant production as proved by a kill of 620,000 male birds on lands that are devoted 70% to 90% to harvested crops. More than 98% of the pheasant bag is said to be made up of naturally propagated birds. The management system is built around State refuges, but gives attention to cover, especially for nesting, planting of feed patches, leaving standing corn for winter, and control of man, cats, dogs, and crows. Surplus stock is trapped and transplanted where needed.

The dependable pheasant crop has made possible a controlled hunting system, which is organized by townships. A game protective association is founded by groups that attend the same school, church, grange or lodge and thus has social solidarity from the beginning. Hunting is by association members only, but non-residents become members by purchase of permit tags at prices ranging from $2 to $3.50, entitling the holder to hunt over all association lands. No hunting is permitted within 500 feet of any building or in standing corn where work is going on, and there are other restrictions. A number of township associations collect from $500 to $1000 per year. The money is spent for printing and posting, hire of enforcement officers, management measures, and social events, and unexpended balances go into school and church funds or are pro-rated to landowners. The advantages of the system are enumerated as follows: "(a) There is an orderly harvest of the surplus crop each year; (b) Law violations are minimized. Unscrupulous hunters avoid controlled hunting areas; (c) Property interests of landowners are protected - trespassing abuses are eliminated; (d) An adequate brood stock is preserved; (e) A larger pheasant yield is possible each year and a given area provides good hunting for more hunters - not less; (f) Landowners regard larger game crops as an asset, not as a liability; (g) Landowners modify agricultural operations in the direction of pheasant management; (h) From 65% to 95% of the farmer-landowners hunt themselves, so view game production from both the farmers' and sportsmen's viewpoints; (i) Ideal farmer-sportsmen relationships are made possible. Sportsmen value highly their granted privileges and farmers take great pride in the number of birds taken on their farms. Instead of repeated posted lands with 'No Hunting' signs, hunters are pleased to see such

refreshing and psychologically sound signs as 'Welcome members of Blank Township Game Protective Association'; (j) The non-resident hunter (city man) is pleased with the system because he is guaranteed good hunting close to home and saves much in time and travel expenses; (k) The system is essentially a democratic and a non-profit one - no one who obeys regulations is excluded. Hunters consider that the small fees paid merely support the regulation and management upon which a continued crop depends. This mutually advantageous system prevents the development of exclusive non-democratic harvest plans."

There is a bibliography of 21 publications bearing on the subject matter, and attached to the leaflet is Release No. 17, Statistics on the game crop of Liberty Township, Wood County, Ohio, showing where the hunters came from and what they bagged; and Release No. 22, Map of Liberty Township Game Protective Association Lands.

Management: Farmer-sportsman relationship

Thompson, Willard C. A triangle of friends. The farmers; game birds of the fields and woods; the huntsmen, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 25 cents a copy), 40(10), Oct. 1936, pp. 208-209, 223-224, 2 photos.

Decrease of game birds due to hunting and intensive agriculture should be compensated for by cooperative efforts in propagation, improvement of farm environment, increased care of wildlife in winter, better relationships between farmers and sportsmen, improving legal status of game, and increasing and diffusing knowledge of it.

Management: Flushing bar

Dalke, Paul D. Game bird flushing apparatus, Connecticut State Board of Fisheries and Game (Hartford, Conn.), Game Management Circular 2, 2 pp., 1 pl., no date, mimeographed.

Need for flushing bar; description and illustration; urges leaving uncut an outside swath of grain and hay fields.

Management: Forest game

Aldous, C. M. Game management on forest areas, Maine Forester (University of Maine, Orono, Me., 50 cents a copy), 1(2), May 1936, pp. 9-11.

On Harvard Forest, Mass., elimination of hardwoods modified the soil so that earthworms, and following them, woodcocks disappeared. Changing back to a mixed stand improved the soil so that both of these organisms were restored. The effect of forest management on wildlife is thus illustrated and it is an important consideration in a State so largely forested as Maine. Forest management and wildlife management can be carried on simultaneously over the same tracts, granted concessions on the part of both the forester and wildlife

manager. Planting should not be in large solid blocks, and where no planting is done the problem of the wildlife manager is to get cuttings distributed in small units and as uniformly as practicable. Timber stand improvement measures should be modified so as to favor wildlife. Fire lanes may be planted to white clover to the advantage of grouse, rabbits, and deer. Areas proportional to cruising radius should be provided with all the requirements of the species involved. A management program for wildlife should answer the questions: What do we have? Where is it? How much of it is there? Is any essential lacking? What can be done about it?

Management: Forest wildlife

McAtee, W. L. Forests and wildlife, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(9), Dec. 1936, pp. 6-8, 4 photos.

Probability that the primeval eastern forest contained openings, and value of such openings to wildlife. Tabulation of Pennsylvania forest (37.31 percent) and non-forest (62.69 percent) game according to the kill of 1935. Suggestions as to management of forest lands based on surveys in Centre County, Pa. Notes on trees, shrubs and other plants and their value to wildlife, and on feed patches.

Management: General directions

Trippensee, R. E. Means of increasing wild life, in A Handbook of Conservation with special reference to the landscape features in Essex County (Society for the Preservation of the Landscape Features of Essex County, Massachusetts, Salem, Mass.), 1936, pp. 34-39.

Management based on thorough knowledge of interrelations of the various forms of wildlife to each other and to their environment. Practical work and research should go hand in hand. Avoid drainage; create watering places; allow a sixth of each area to remain natural; plant fruit-bearers as bittersweet, Japanese barberry, Russian mulberry, flowering apple, native apple, flowering dogwood, red-osier, and mountain ash; plant feed patches of buckwheat, proso, millet, hemp, flax, and sunflower; maintain winter feeding stations. Do all things necessary to preserve adequate breeding stock.

Management: History

Morton, James N. History of game management, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(1), April 1937, pp. 12-14, illus.

Reference to ancient modes of hunting, earliest known and later restrictions, modern developments including refuge and management systems.

Management: In Germany

Leopold, Aldo. Notes on game administration in Germany, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 25(6), Nov.-Dec. 1936, pp. 85, 92-93, 6 photos.

Game administration is strictly centralized and is manned largely by volunteers without even adequate expense allotments. Game on public forests is administered by the forest service. Hunting goes with control of land and the net result is that it is restricted to foresters, officials, landowners, and people of means. The number of hunters in proportion to the population is smaller than in the United States but the kill per hunter is larger. An all day oral examination is held for applicants for hunting licenses. Regulation of the kill is accomplished by limiting the number of head shot on each hunting unit. Care of game is enjoined on the landowner by law, hence wardens become game management advisers. The system is well adapted to the maintenance of resident, but not of migratory, game. Notes are given on regulations, hunting customs, and on fish ponds. From observations of "vermin control" about these ponds, the conclusion is drawn that "too-artificial culture of one wildlife resource is usually in the last analysis bought at the expense of some other wildlife resource."

Management: Nest boxes for wood duck

Amadon, Dean. Nest boxes for wood ducks, Connecticut State Board of Fisheries and Game (Hartford, Conn.), Game Management Circular 4, 2 pp., 1 pl., no date, mimeographed.

Measurements, materials, location, and care of boxes. Illustration of box on tree with ramp.

Management: Planting

Dalke, Paul D. Suggestions for increasing the game in Connecticut by improving the environment, Connecticut State Board of Fisheries and Game (Hartford, Conn.), Game Management Circular 3, 6 pp., 1 pl., no date, mimeographed.

The supply of game can be increased when it is treated as a regular crop of the land. Hints regarding cover. Notes on feed patches and what to plant in them. Value of fruiting shrubs, table showing their bearing seasons, instructions for propagating and planting them.

Management: Planting

McIntyre, Arthur C. Revegetating eroding hillsides, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(9), Dec. 1936, pp. 9, 16.

General statement of need of erosion control. Planting program, its potential value to wildlife; notes on plantings made in Pennsylvania in 1935

and requirements for 1936 and 1937, with special mention and statistics on species of particular importance for wildlife.

Management: Planting

Pearson, Allen M. Making soil conservation beneficial to wildlife, Georgia Sportsman (412 State Capital, Atlanta, Ga., 10 cents a copy), 1(3), pp. 3-4, 3 photos (1 of author).

"As goes the soil so goes the game." Many plants effective in controlling erosion are also suitable for wildlife development. Lespedezas, beggarweed, millets, sorghums, benne, cowpeas, and soy beans useful in open situations and privet, beautyberry, Russian olive, plum, and Scotch broom in gullies. Suggestions as to planting.

Management: Ponds

Davis, Cecil N. Wildlife saving farm ponds of Missouri, Soil Conservation (Supt. of Documents, Washington, D. C., 10 cents a copy), 2(7), Jan. 1937, pp. 153-155, 159, 6 photos.

Construction of ponds and planting both water and shore. Value to wildlife for water supply, food, and cover.

Management: Refuges

Goldman, Edward A. Bird refuges in the United States, The World Today (Encyclopaedia Brittanica, Inc., 342 Madison Ave., New York, N. Y.), 4(2), Dec. 1936, pp. 3-7, 4 photos.

Original wealth of wildlife including waterfowl; direct and indirect destruction by man; protection by treaty, by law, and by refuges. Acquisition of the Federal refuges outlined; and their number, location, and importance indicated. Briefer accounts of the Audubon refuges, National Park, National Forest and other classes of refuges.

Management: Refuges

Grinnell, Joseph, and Jean M. Linsdale. Vertebrate animals of Point Lobos Reserve, 1934-35, Carnegie Institution of Washington (Washington, D. C.), Publication No. 481, 159 pp., 39 pls., 1 fig., Dec. 1936.

A state park in Monterey County, Calif., its history, topography, meteorology, and ecology, with annotated lists of vertebrates and recommendations for administration.

Management: Refuges

Phillips, J. C., et al. Protected areas not locally administered, in A Handbook of Conservation with special reference to the landscape features in Essex County (Society for the Preservation of the Landscape Features of Essex County, Massachusetts, Salem, Mass.), 1936, pp. 71-78.

Description of 14 reservations in Essex County, Mass., with special notes on the wildlife of 5 of them by Ludlow Griscom.

Management: Refuges, Malheur Lake

Jewett, Stanley. Malheur Lake - greatest of wildfowl refuges, Outdoor America (1167 Merchandise Mart, Chicago, Ill., 10 cents a copy), N. S. 1(11), Sept. 1936, pp. 6-7, 3 photos.

History of the area which, including Malheur and Harney Lakes and the Blitzen River Valley, comprises 164,000 acres. Account of the breeding and migrant birds; the refuge harbors also numerous beavers, mule deer, and antelopes. Description of alterations made to conserve the water supply and facilitate administration.

Management: Seed storage, aquatic plants

Muenscher, W. C. Storage and germination of seeds of aquatic plants, Cornell Univ. Agr. Expt. Sta. Bul. (Cornell University Agricultural Experiment Station, Ithaca, N. Y.), 652, 17 pp., 3 tables, July 1936.

Author's summary: "Freshly harvested seeds of 43 species of aquatic plants growing wild in New York State were subjected to storage treatments as follows:

Series 1, stored in water at 1-3° C.
Series 2, stored in water at room temperature.
Series 3, stored dry at 1-3° C.
Series 4, stored dry at room temperature.

"The results of germination tests made on seeds of each series after about 2, 5, and 7 months in storage indicate that storage in water at a temperature just above freezing is the best of the treatments applied to insure viability and quick germination in most of the species tested.

"With few exceptions, seeds of most of the species would not germinate after 2 to 5 months of storage in water at room temperature. Seeds so treated entered a rest period but they could be induced to germinate by subsequently chilling them for 30 days. Seeds of Vallisneria, Orontium, and Nasturtium germinated well within 2 months after harvest, without chilling.

"The seeds of most species failed to germinate after 2 to 5 months in dry storage at 1-3° C. or at room temperature. In some species such as those of Orontium, Peltandra, Vallisneria, and Zizania drying the seed killed the embryo. In others drying prolonged the dormant state of the seed or, largely through changes in the seed coat or pericarp, caused it to enter a long rest period.

"The poor germinations of seeds of aquatic plants obtained by previous workers are believed to be due largely to the effects of drying and not to a normal dormant period of long duration. The storage conditions after which the best germination results were obtained approach nearest to the conditions to which seeds of aquatic plants are subjected when they are shed naturally, in water at low temperature from late autumn until early spring.

"The results of the germination tests here reported lead to the suggestion that seeds of most aquatic plants intended for planting should never be allowed to dry, but should be stored in water just above freezing temperature, until time for planting in the spring. Such treatment should provide a source of viable seed that can be shipped for some distance with the assurance that the seeds will germinate soon after they are planted in a suitable habitat."

Management: Stocking

Couch, Leo K. Trapping and transplanting live beavers, U. S. Dept. Agr. Farmers' Bul. (Supt. of Documents, Washington, D. C., 5 cents a copy), 1768, 18 pp., 15 figs., March 1937 (April).

Because of their value in water conservation, beavers that become destructive can well be moved to localities where they can do no harm. They can be trapped and moved at a cost of $10 or less each and have a market value alive much greater than that. Restocking operations in Wisconsin and Pennsylvania have restored beaver as trapable fur bearers and added materially to the income of rural sections. This bulletin discusses economics of the beaver, live trapping equipment and operations, holding pens, transportation, and stocking sites, operations, and costs.

Management: Stocking, Connecticut results

Anon. The liberation of pheasants in relation to reports of pheasants killed in Connecticut, Connecticut State Board of Fisheries and Game (Hartford, Conn.), Game Management Circular 5, 12 pp. plus 1 inserted chart and 1 sheet of tables, Dec. 1, 1936, mimeographed.

A careful analysis and comparison of figures for liberations from 1908 to 1936 and for the pheasant bag from 1923 to 1935, which are set forth also in a table and a graph. The main conclusions are: "1. The success of shooting seasons is dependent mostly on the results of natural propagation; 2. The liberation of pheasants contributes to the success of the subsequent shooting seasons only indirectly so far as it provides breeding stock; 3. The results of natural propagation are dependent upon weather conditions and upon other factors such as the supply of food and cover and the abundance of predators; 4. The liberation of pheasants beyond a certain point or number does not improve shooting in proportion either to the number liberated or to the expense. The records indicate that a liberation [in Connecticut] of about 12,000 birds in approximately equal sex ratio will give the maximum returns per dollar expended." (p. 8)

The report continues: "It may be that an annual liberation of about 12,000 birds, supplementing the population carried over from the previous year, together with the birds resulting from natural increase, constitutes a saturation point which is dependent on the availability of suitable food, cover, and range." (p. 9) The probability is pointed out that the saturation point has been reached, about 1 bird to 10 acres for parts of the State not in woods and not urbanized. Decrease in farming including practical abandonment of cereal

growing does not augur well for maintenance of the pheasant population.

A one-page report on results of distribution of pheasant eggs estimates that 2,800 pheasants were raised from 11,572 eggs. The ratio of birds reared and liberated to the number of eggs distributed has increased from 18 percent in 1933 to 24 percent in 1936.

Management: Suggestions for California

Storer, Tracy I. Game management on private lands in California, 8 pp., mimeographed, Nov. 1936. Obtainable from the author, University of California, Davis, Calif.

A paper read at the annual meeting of the Conservation Section, California State Chamber of Commerce. That State like most of the others having ravaged game and its environment and having tried the usual ineffective remedies finds it necessary to do something really constructive. Suggestions are given based on the fundamental environmental factors and their management for the benefit of wildlife. There is discussion also of public vs. private management, the benefits accruing from proper game management, and management measures capable of immediate application.

Management: Upland game birds, general policies

Anon. More upland game birds, More Game Birds in America (500 Fifth Ave., New York, N. Y.), 47 pp., illus. 1936?

A discussion of the decline in upland game birds and its causes, and what can be done about it, with suggestions for contributory legislation. The insistence upon the rights of landowners and upon the necessity of payment for sport is commendable. It is misleading, however, to point to conditions abroad where "excellent shooting is always available during long open seasons" for that expression does not apply anywhere to the thing American gunners have chiefly in mind, namely, public shooting. In view of recent findings, especially by Errington, the stressing of vermin control seems out-of-date. It is stated that predators have been little affected by the environmental changes inimical to game birds and that they have not been reduced to the same extent by man. On the contrary the fur producing predators have been very greatly reduced and predatory birds brought to the verge of extermination over great areas.

Management: Water supply development

Hogg, John E. Man-made oases save desert birds, Popular Science Monthly (353 Fourth Ave., New York, N. Y., 15 cents a copy), 129(4), Oct. 1936, p. 46, 3 photos.

Account of the development in the Southwest of seeps, springs, wells, etc., conservation of the water supply, and making it available to wildlife.

Management: Winter feeding

Anon. Winter feeding stations and foods for Michigan ground feeding birds, Michigan Conservation (State Dept. of Conservation, Lansing, Mich.), 6(6), Nov.-Dec. 1936, pp. 3-4, 6 photos.

Budding species like grouse rarely patronize feeding stations; for both granivorous birds and mammals, however, they may be life-savers in severe winter weather. Notes on natural foods, and upon locating, building, and servicing feeding stations.

Management: Winter feeding

Fox, Adrian C. Winter feeding of North Dakota birds, Soil Conservation Service (North Dakota Project No. 1, Park River, N. D.), 14 pp., 19 figs., mimeographed, 1936.

Sketches of numerous devices useful in winter feeding, with 3 pages of text devoted to deficiencies of cover and food, available natural foods and their value, feeding devices and shelters and their care; and one page of references to other publications.

Management: Winter feeding

Nagel, Werner O., and Rudolf Bennitt. Feeding stations and shelters for quail on Missouri farms, Mo. Agr. Extension Service Circ. (University of Missouri, Columbia), 356, 8 pp., 6 figs., Jan. 1937.

Drought and grasshoppers have greatly reduced quail food supplies and severe winters make feeding necessary if the birds are to survive on many farms. General directions are given as to the location and care of feeding stations and specific instructions with illustrations relating to tepee-type and lean-to shelters and feeders.

Natural History: Arizona

Authors. Arizona and its heritage, University of Arizona General Bul 3 (Univ. of Arizona, Tucson, $1.50 a copy), 291 pp., illus., April 1936.

Brief accounts are given of the more conspicuous forms of wildlife in chapters on Large Game Mammals and Large Predator Animals by A. A. Nichol, and on Important Rodents, Important Birds, and Important Reptiles by C. T. Vorhies.

Pollution

Trippensee, R. E. Pollution, in A Handbook of Conservation with special reference to the landscape features in Essex County (Society for the Preservation of the Landscape Features of Essex County, Massachusetts, Salem, Mass.), 1936, pp. 25-28.

Destructiveness of pollution; suggestions as to steps an individual can take to help remedy the trouble.

Predation: General discussion of

Errington, Paul L. Recent predator studies, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(12), March 1937, pp. 14, 30.

A summary of findings from 8 years of work with the principal game and fur species and nearly all kinds of predators in the Upper Mississippi Valley. In addition to field observations the results of about 15,000 analyses of food material underly the conclusions. The importance of carrying capacity of the environment is emphasized as is the inability of predators to remove anything but the excess population. Populations above carrying capacity are vulnerable and the relative availability of such populations determines what predators feed upon. Ordinary vermin control operations are "useless or worse".

"From the standpoint of economics or of wildlife management, some reduction in the numbers of certain predators may now and then be desirable, but it is hard to see virtue in the blind and excessive practices too often indulged in. Animal populations being to a large extent self-limiting within the bounds imposed by environment and hereditary make-up, much of the predation upon them doesn't really seem to count anyway, conspicuous though it may be.

"By all odds, what amounted to the most effective predator control I've ever seen was accomplished on a wildlife refuge where hawks and owls were protected along with the other native residents, but where the food and cover relationships were handled intelligently."

Propagation: Brooding in dark to control vices

Bedell, C. S. Pheasants in the dark, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 25 cents a copy), 40(10), Oct. 1936, pp. 206, 230, 2 photos.

Rearing in the dark adopted to stop toe picking and other cannibalistic practices. The birds are kept indoors until 12 weeks of age and are given no green food or eggs. Description of brooders and their management during the period is given. The method is considered as a long step toward economical mass production.

Propagation: Chukar partridge

Sibley, C. L. The feeding and care of chukars, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 25 cents a copy), 40(10), Oct. 1936, p. 212.

Chiefly feeding directions; rearing on wire is recommended; one hen laid 69 eggs.

Propagation: Hungarian partridge

Wessell, Charles W. Raising the Hungarian partridge, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 7(12), March 1937, pp. 4-5, 4 photos.

Hand-reared stock decidedly preferable; notes on distinguishing the sexes, and on care of breeders. Habits in the field; comparison with bobwhite.

Propagation: Irradiation results

Clark, Leonard B., Samuel L. Leonard, and Gardiner Bump. Light and the sexual cycle of game birds, Science (Lancaster, Pa., 15 cents a copy), 85(2205), April 2, 1937, pp. 339-340.

Conclusions from experiments are: "The absence of light inhibits the onset of sexual activity in the grouse and pheasant. x x x Continuous illumination during the winter months can stimulate grouse into sexual activity and egg-laying but does not prevent the cessation of egg-laying. x x x [This] is probably due to a failure of the hypophysis to furnish the necessary gonad-stimulating hormones rather than to an exhaustion of the gonads. x x x The gonads of immature pheasants will respond to adequate hypophyseal stimulation."

Summary: "The results of these experiments has led us to conclude that light is a primary factor in inducing sexual activity in pheasants, quail and grouse, through the mediation of the hypophysis. Once this hypophyseal-gonad reaction is started it can not continue indefinitely with adequate light but only until the hypophysis falters in the production of the gonad-stimulating hormone through causes unknown. The immature pheasant resembles the adult at the close of the breeding season in that the gonads are capable of responding to adequate hypophyseal stimulation."

Propagation: Pheasants

Simpson, 'Gene M. Directions for raising game pheasants, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 7(1), Jan. 1937, pp. 6-7, 14, illus.

Directions for small scale breeding, covering rearing pens, brood coops, and runways, preparation of nests, setting hens, care of young, and feeding.

Propagation: Protein requirements of pheasant

Norris, L. C., L. J. Elmore, R. C. Ringrose, and Gardiner Bump. The protein requirements of ring-necked pheasants, Poultry Science (Cornell University, Ithaca, N. Y., 75 cents a copy), 15(6), Nov. 1936, pp. 454-459, 5 tables.

Growth increased with rise in the protein content of the diet as far as tested (33 percent). Biometrical analysis of the results indicates that 30 percent of protein is necessary during the first eight weeks of life in order

to promote a maximum rate of growth; in ordinary practice a 24 percent level will be satisfactory. Bibliography of 7 titles.

Propagation: Wild turkey

Steinhart, C. V. The propagation of wild-trapped turkeys, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 25 cents a copy), 40(12), Dec. 1936, pp. 247, 258, 2 photos.

General account of system used on a 'southern plantation': taming, nesting, brooding, hardening, shipment.

Research: Necessary basis for management

Leopold, Aldo, Chairman. Wildlife crops, finding out how to grow them, American Wildlife Institute (Investment Bldg., Washington, D. C.), 23 pp., illus., 1936.

A research and demonstration program prepared by the Technical Committee of the American Wildlife Institute. Committee members, besides the Chairman, are Gardiner Bump, George C. Embody, Carl L. Hubbs, and Herbert L. Stoddard; photographs of these men form the frontispiece. The report is organized about the why, how, and what of research and projects are suggested for farm, forest, range, and migratory game, fur animals, non-shootable game, and rare or threatened non-game species. Research can furnish the facts for management, and management can furnish abundant wildlife wherever it can control the condition of the range or environment.

ADDENDUM

Conservation

Haskell, Wm. S. The American Game Protective and Propagation Association. A history. Published by the Association (19 Rector St., New York, N. Y.), 67 pp., 2 pls., Feb. 1937.

History of the Association which was organized in 1911 and largely transformed into the American Wildlife Institute in 1935, and of the major conservation movements which it sponsored. The American Sportsmen's Platform and The American Game Policy are reprinted. The two plates reproduce photographs of John B. Burnham, Carlos Avery, Seth Gordon, and William B. Greeley.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-72. Check-list of marsh and aquatic plants of the United States, by Neil Hotchkiss, December 1936, 27 pp.

Contribution toward a standardized list of both the scientific and vernacular names of these plants.

BS-77. The wild turkey on the Missouri Ozark Range, by Harold L. Blakey, January 1937, 32 pp., 2 pls., 1 table.

Characteristics of the native turkey and of restocking birds; life history including mating, nesting, food habits, with table of food items; checks to increase; management; and conservation. Bibliography of 6 titles.

BS-78. Directions for destroying house mice, January 1937, 2 pp.

Trapping, poisoning; cats as mousers; repelling mice.

BS-80. Feeding and caring for squirrels, January 1937, 2 pp.

Food; cages and nests; care and sanitation.

BS-81. Suggestions for combating starling roosts, by E. R. Kalmbach, February 1937, 17 pp., 1 plate.

Introduction, present range, and economic status of starlings; objectionable roosts and methods of controlling them; reducing numbers of starlings; bibliography of 5 titles.

BS-84. Food of the scaled quail, by Leon H. Kelso, March 1937, 9 pp., 2 tables.

Description of bird and statement of its range and habitat. Report on study of stomachs and crops of 258 adult and 9 immature scaled quail. Vegetable matter taken by adults 78.12 percent, main items, grains and greens; the plants Sophia menziesii and Gutierrezia texana patronized more than others; animal food 21.88 percent, largest single item, grasshoppers. The percentages of vegetable and animal food for the 9 young studied are almost the reverse of those for the adults, namely, 28.82:71.17. A table compares the findings with those for three other species of quail. There is a summary and a bibliography of 12 titles.

BIOLOGICAL BIBLIOGRAPHIES

Biological journals

Of general scope

The American Journal of Anatomy. Bi-monthly, $7.50 a year. Wistar Institute of Anatomy and Biology, 36th St. and Woodland Ave., Philadelphia, Pa.

American Journal of Science. Monthly, $6.00 a year, single copy 60 cents. New Haven, Conn.

American Naturalist. Bi-monthly, $5.00 a year, single copy $1.00. Science Press, Grand Central Terminal, New York, N. Y.

The Anatomical Record. Monthly, $5.00 a year. Wistar Institute of Anatomy and Biology, 36th St. and Woodland Ave., Philadelphia, Pa.

Aquatic Life. Monthly, $1.50 a year. August M. Roth, 614 N. Chester St., Baltimore, Md.

Biological Abstracts. Monthly, $9.00 a year. University of Pennsylvania, Philadelphia, Pa.

The Biological Bulletin. Issued six times a year, $4.50 a year, single copy $1.75. Prince and Lemon Sts., Lancaster, Pa.

Canadian Journal of Research. Monthly, Sections C and D, Botanical and Zoological Sciences, $2.50 a year, single copy 25 cents. National Research Council, Ottawa, Canada.

Genetics. A Periodical Record of Investigations bearing on Heredity and Variation. Bi-monthly, $6.00 a year, single copy $1.25. Genetics, Menasha, Wis.

Guide to Nature. Quarterly, $1.00 a year, single copy 25 cents. Agassiz Association, Inc., Old Greenwich, Conn.

Journal of Agricultural Research. Semi-monthly, $2.25 a year. Supt. of Documents, Washington, D. C.

Journal of Bacteriology. Monthly, $10.00 a year. Williams & Wilkins Co., Baltimore, Md.

The Journal of Experimental Zoology. Issued eight times a year, $7.50 a year. Wistar Institute of Anatomy and Biology, 36th St., and Woodland Ave., Philadelphia, Pa.

Journal of General Physiology. Bi-monthly, $5.00 a year, single copy $1.00. Rockefeller Institute for Medical Research, York Ave. and 66th St., New York, N. Y.

The Journal of Heredity. Monthly, $3.50 a year, single copy 35 cents. American Genetic Assoc., Victor Bldg., Washington, D. C.

Journal of Morphology. Quarterly, $12.00 a year. Wistar Institute of Anatomy and Biology, 36th St. and Woodland Ave., Philadelphia, Pa.

The Journal of Parasitology. Bi-monthly, $4.00 a year. Lancaster, Pa.

Natural History. Journal of the American Museum of Natural History. Monthly (except July and August), $3.00 a year, single copy 50 cents. New York, N.Y.

Nature Magazine. Monthly, $3.00 a year. 1214 - 16th St., N.W., Washington, D. C.

Nature Notes. Monthly, $1.00 a year, single copy 10 cents. 4800 Prospect Road, Peoria, Ill.

Northwest Science. Issued five times a year, $1.00 a year, single copy 35 cents. The Northwest Scientific Association, Cheney, Wash.

Philosophy of Science. Quarterly, $5.00 a year. Williams and Wilkins Co., Baltimore, Md.

Physiological Reviews. Quarterly, $6.00 a year, single copy $2.50. D. R. Hooker, 19 W. Chase St., Baltimore, Md.

Popular Science Monthly. Monthly, $1.50 a year, single copy 15 cents. Popular Science Publishing Co., Inc., 353 Fourth Ave., New York, N. Y.

The Quarterly Review of Biology. Quarterly, $5.00 a year, single copy $1.50. Williams and Wilkins Co., Baltimore, Md.

Science. Weekly, $6.00 a year, single copy 15 cents. The Science Press, Lancaster, Pa.

Science News Letter. Weekly, $5.00 a year, single copy 15 cents. Science Service, 2101 Constitution Ave., Washington, D. C.

Scientific American. Monthly, $4.00 a year, single copy 35 cents. 24 West 40th St., New York, N. Y.

Scientific Monthly. Monthly, $5.00 a year, single copy 50 cents. The Science Press, Lancaster, Pa.

Of local scope

The American Midland Naturalist. Bi-monthly, volumes and single copies variously priced. University of Notre Dame, Notre Dame, Ind.

Florida Naturalist. Quarterly, $1.00 a year. Florida Audubon Society, Daytona Beach, Fla.

Ohio Biological Survey Bulletin. Issued irregularly, volumes of about 500 pages each, $3.00, single copies variously priced. Ohio State University Press, Columbus, Ohio.

The Ohio Journal of Science. Bi-monthly, $2.00 a year, single copy 50 cents. Ohio State University, Columbus, Ohio.

Botanical journals

American Botanist. Quarterly, $2.00 a year, single copy 50 cents. Willard N. Clute & Co., Butler University, Indianapolis, Ind.

American Fern Journal. Quarterly, $1.25 a year. Brooklyn Botanic Garden, Brooklyn, N. Y.

American Forests. Monthly, $4.00 a year. American Forestry Association, 1713 K St., N. W., Washington, D. C.

American Journal of Botany. Issued ten times a year, $8.00 a year, single copy $1.00. Boyce-Thompson Institute for Plant Research, Yonkers, N. Y.

Botanical Gazette. Quarterly, $8.00 a year. University of Chicago, Chicago, Ill.

The Botanical Review. Monthly, $3.00 a year. Lime & Green Sts., Lancaster, Pa.

Bulletin of the Torrey Botanical Club. Issued nine times a year, $6.00 a year. Columbia University, New York, N. Y.

Claytonia. Quarterly, $1.50 a year. 213 Maiden Lane, Lexington, Va.

Desert Plant Life. Monthly, $1.50 a year, single copy 25 cents. Desert Magazine Publishing Co., 216 South Brand Boulevard, Glendale, Calif.

Journal of the Arnold Arboretum. Quarterly, $4.00 a year, single copy $1.25. Jamaica Plain, Mass.

Journal of Forestry. Monthly, $4.00 a year. Society of American Foresters, Mills Bldg., Washington, D. C.

Journal of the Southern Appalachian Botanical Club. Monthly, $2.00 a year. West Virginia University, Morgantown, W. Va.

Leaflets of Western Botany. Issued about four times a year, $1.00 a volume, single copy 40 cents. Academy of Sciences, San Francisco, Calif.

Madrono, A West American Journal of Botany. Quarterly, $2.50 a year, single copy 75 cents. Carnegie Institution of Washington, Stanford University, Calif.

Plant Physiology. Quarterly, $8.00 a year, single copy $2.50. Lime & Green Sts., Lancaster, Pa.

Phytologica. Designed to expedite botanical publication. Issued irregularly, $5.00 per volume in advance. New York Botanical Garden, Bronx Park, New York, N. Y.

Rhodora. Monthly, $2.00 a year. 300 Massachusetts Ave., Cambridge, Mass.

Torreya. Bi-monthly, $1.00 a year. Columbia University, New York, N. Y.

Museum and society publications, excluding those of Academies of Science

Bulletin: California Institute of Technology. Quarterly, no price quoted. Pasadena, Calif.

Bulletin of the Boston Society of Natural History. Quarterly, no price quoted. Boston, Mass.

Bulletin of the Ecological Society of America. Quarterly, $1.00 a year. Natural History Bldg., Urbana, Ill.

Bulletin of the Museum of Comparative Zoology. Issued irregularly, parts variously priced. Cambridge, Mass.

Bulletin: New York Zoological Society. Bi-monthly, $1.50 a year, single copy 30 cents. New York, N. Y.

Bulletin of the Zoological Society of Philadelphia. Bi-monthly, no price quoted. Philadelphia, Pa.

Ecological Monographs. Quarterly, $6.00 a year, single copy $1.50. Duke University Press, Durham, N. C.

Ecology. Quarterly, $4.00 a year, single copy $1.25. Prince and Lemon Sts., Lancaster, Pa.

Journal of the Elisha Mitchell Scientific Society. Semi-annual, $3.00 a year, single copy $1.50. University of North Carolina Press, Chapel Hill, N. C.

New York State Museum Bulletin. Monthly, no price quoted. The University of the State of New York, Albany, N. Y.

New York State Museum Handbook. Issued irregularly, no price quoted. The University of the State of New York, Albany, N. Y.

Occasional Papers of the Museum of Zoology, University of Michigan. Issued irregularly, no price quoted. University of Michigan Press, Ann Arbor, Mich.

Proceedings of the Colorado Museum of Natural History. Issued irregularly, no price quoted. Denver, Colo.

Proceedings of the New England Zoological Club. Issued irregularly, no price quoted. Museum of Comparative Zoology, Cambridge, Mass.

Transactions of the San Diego Society of Natural History. Issued irregularly, no price quoted. San Diego, Calif.

Zoologica. Scientific Contributions of the New York Zoological Society. Quarterly, prices fixed by the cost of printing. New York, N. Y.

Zoological Series of the Field Museum of Natural History. Issued irregularly, no price quoted. Chicago, Ill.

Zoopathologica: Scientific Contributions of the New York Zoological Society on the Diseases of Animals. Issued irregularly, no price quoted. New York, N. Y.

NOTES AND NEWS

Information concerning the four major North American waterfowl flyways and the biologists assigned to them. As outlined in Department Circular No. 342, "The Waterfowl Flyways of North America", there are four major flyways on the North American continent which may be designated as the Atlantic, Mississippi, Central, and Pacific. Obviously, the boundaries of these lanes do not follow political lines nor are they sharply defined in the interior of the country. In other words, there is more or less overlapping and in the North this may result in identical territory for two or more flyways. However, for administrative reasons it is necessary that the territory assigned to the different biologists follow political boundaries. The biologist assigned to each flyway is authorized to perform official travel in the states designated as in his flyway.

Atlantic Flyway.- The territory included in this region is the West Indies, Florida, Alabama, Georgia, South Carolina, North Carolina, Tennessee, Kentucky, Virginia, West Virginia, Maryland, Ohio, Pennsylvania, New Jersey, Delaware, New York, all of New England, Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfounland (including Labrador), the eastern islands of Franklin and Greenland.

Effective February 1, 1937, Harold S. Peters was transferred from the cooperative wildlife research unit at Alabama Polytechnic Institute, Auburn, Ala., in the section of Wildlife Surveys, to become the flyway biologist of the Atlantic flyway. His temporary headquarters are at Auburn but he will later be transferred to Washington, D. C., where he will do research and bird migration work on the Atlantic Flyway.

Mississippi Flyway.- The territory included in this flyway is Mexico and other Central American countries, Texas, Louisiana, Mississippi, Arkansas, Tennessee, Kentucky, Missouri, Illinois, Indiana, Ohio, Michigan, Iowa, Nebraska, Wisconsin, Minnesota, South Dakota, North Dakota, Montana, Ontario, Manitoba, Saskatchewan, Alberta, Mackenzie, Yukon, and Alaska.

Charles E. Gillham, formerly of the Division of Game Management, was transferred to the Research Division early in 1936 and assigned to duty as the flyway biologist of this flyway. His headquarters are at Iowa State College, Ames, Iowa.

Central Flyway.- The region of this flyway includes Mexico and other Central American countries, Texas, Louisiana, Arkansas, Missouri, Oklahoma, New Mexico, Arizona, Utah, Colorado, Kansas, Nebraska, Wyoming, South Dakota, North Dakota, Montana, Manitoba, Saskatchewan, Alberta, Mackenzie, Yukon, and Alaska.

Effective March 1, 1937, Dr. Geo. B. Saunders, formerly of the Migratory Waterfowl Division, was transferred to the position of flyway biologist for the Central Flyway. His headquarters are in the Customs House, Denver, Colo.

Pacific Flyway.- This flyway includes Mexico and other Central American countries, Arizona, California, Utah, Nevada, Idaho, Montana, Oregon, Washington, Saskatchewan, Alberta, British Columbia, Mackenzie, Yukon, and Alaska.

When the Section of Distribution and Migration of Birds was first created in 1934, the only field representative then on the staff was Luther J. Goldman, who for a year or two had to cover many areas on annual waterfowl surveys. His activities are now limited to the Pacific Flyway and his headquarters are at 1092 Keith Ave., Berkeley, Calif.

Dr. Allen M. Pearson of the Soil Conservation Service with headquarters at Rome, Georgia, has been transferred to the Biological Survey to take the position vacated by Mr. Peters (see previous note) and will be stationed at Auburn, Ala.

The Ohio Cooperative Wildlife Research Station has issued some 20 mimeographed statements relating to its work. Three of these are abstracted in preceding pages (21 to 22) and three others may be briefly noted here. Release No. 19 gives general information relating to the Station, including definition, objectives, directorial staff, location (including field stations), and problems under investigation. Release No. 21 describes Wildlife Conservation Schools conducted in cooperation with the Ohio Division of Conservation. There were week long classes organized in three divisions of the State and attended by an average of 58 students. The methods of conducting the schools are comprehensively outlined. Release No. 24, entitled A Wildlife Management Primer for Ohio, is devoted to an exhibit at the Toledo Sportsmen's Exposition of February 1937. The legends for the exhibits are quoted.

There are now about 21 universities and colleges that have schools of conservation. 9 of these also have wildlife research units in cooperation with the Biological Survey. There are about 45 college staff members and 33 graduate students cooperating with the Biological Survey on projects in wildlife management.

The Migratory Bird Treaty with Mexico was formally ratified March 15, 1937. The terms of the treaty enable the United States to give Federal protection to some 140 species of birds not covered by the Canadian Treaty of 1916.

The Forest Service announces that special efforts are being made to protect the remaining few California Condors, headquarters for which are in the Los Padres National Forest.

Humane traps, that catch and hold animals with a loop of flexible chain and cannot mangle their catch, have been ordered to replace steel jaw traps on all Indian lands. A holiday for wildlife has also been declared. Only wild animals harmful to crops and domestic animals may hereafter be exterminated on lands under the Office of Indian Affairs.

(Science News Letter, Vol. 31, No. 832, March 20, 1937, p. 184.)

The Massachusetts Department of Conservation (Boston) has issued (Feb. 1937) in mimeographed form a "policy" and a "general plan" for the development of State Forests in relation to wildlife.

The magazine "Conservation" has assumed new octavo form, and is to be a bi-monthly digest of current articles on the conservation of natural resources. It is published by The American Forestry Association, 919 - 17th St., Washington, D. C., at $1.00 a year; 20 cents a copy.

A publication in octavo leaflet form called The Eskimo is devoted to the interest of Alaskan natives, particularly Eskimos and to their reindeer industry. It is issued quarterly at 3627 Ashworth Avenue, Seattle, Washington.

National Nature News is a new publication intended primarily for the presentation of material that can be used for teaching natural history. It is to be issued monthly at $2.00 per year and can be addressed at 3107 Wisconsin Ave., Washington, D. C.

The Wildlife Society.- Following a year of existence under the name Society of Wildlife Specialists, formal organization of The Wildlife Society was accomplished at St. Louis, Mo., February 27-March 2, 1937. The Society is primarily a professional group in which Active Members shall be those engaged in the practice or teaching of wildlife research, management, or administration, or who are graduate students of those subjects. Associate Members shall be those interested in the objects of the Society who are sponsored by two Active Members. Some of the principal objectives of The Wildlife Society are the development of all types of wildlife management along sound biological lines, the establishment of professional solidarity among conservation biologists, and the maintenance of the highest possible professional standards.

An official organ, The Journal of Wildlife Management, to contribute to these ends, will be launched in 1937, probably as a quarterly, under the editorship of W. L. McAtee, U. S. Biological Survey, Washington, D. C.

The governing body of the Society for the year 1937 consisting of the officers and six regionally representative councillors, includes:

President, Rudolf Bennitt, Associate Professor of Zoology, University of Missouri, Columbia, Mo.

Vice-President, Joseph S. Dixon, Field Naturalist, National Park Service, San Francisco, Calif.

Secretary, Victor H. Cahalane, Assistant Chief, Wildlife Division, National Park Service, Washington, D. C.

Treasurer, Warren W. Chase, Regional Biologist, Soil Conservation Service, Des Moines, Iowa.

Councillors:

For Region 1 (Northeast), Arthur A. Allen, Professor of Ornithology, Cornell University, Ithaca, N. Y.

For Region 2 (Southeast), William J. Howard, Regional Wildlife Technician, National Park Service, Richmond, Va.

For Region 3 (North Central), Samuel A. Graham, Professor of Economic Zoology, University of Michigan, Ann Arbor, Mich.

For Region 4 (Northern Great Plains), Verne E. Davison, Regional Biologist, Soil Conservation Service, Rapid City, S. Dak.

For Region 5 (Southwest), Walter P. Taylor, Senior Biologist, Bureau of Biological Survey, Texas A. & M. College, College Station, Texas.

For Region 6 (West), E. Lowell Sumner, Jr., Regional Wildlife Technician, National Park Service, San Francisco, Calif.

The following Advisory Committee also has been named by the President:

Aldo Leopold, University of Wisconsin, Madison, Wis.
Herbert L. Stoddard, Thomasville, Ga.
Joseph Grinnell, University of California, Berkeley, Calif.
Ralph T. King, University of Minnesota, St. Paul, Minn. (past President)

Correspondence should be addressed to the Secretary.

Dr. Percy R. Lowe of the British Museum, retired, is Chairman of the British Section of an international committee that is investigating the status of wild fowl in Europe. Dr. Lowe in a statement made several years ago said unless there is international action for their protection that the wild fowl and waders of Europe are doomed, and it is evident from the present cooperative effort that representatives of other nations agree with him. This

situation should help to correct the idea that seems to be prevalent among American sportsmen that game of all kinds is much more abundant in Europe than in this country.

Some American wildlife managers may be interested in Journal of the Society for the Preservation of the Fauna of the Empire [British] which discusses rare species and the methods that are being taken or should be taken to preserve them. The January 1937 issue (96 pp.) contains contributions relating to Ceylon, Malaya, British North Borneo, British West Indies, North Africa, Tanganyika Territory, and Zululand. There is also an article of general application on "Mammals which have recently become extinct and those on the verge of extinction". The publication contains brief sketches relating to restocking of the Crow Indian Reservation in Montana and Wyoming, and to the effects of drought on wildlife in the United States. It may be obtained from Stephen Austin & Sons, Ltd., 1 Fore St., Hertford, England, for 2 shillings, 6 pence a copy.

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WILDLIFE REVIEW

AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
ISSUED FOR THE INFORMATION OF COOPERATORS
BY THE
BUREAU OF BIOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF AGRICULTURE

CLEMSON COLLEGE
OCT 21 1937
REF. DEPT.

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Washington, D. C. No. 9 July, 1937

Conservation

Murphy, Robert Cushman. Conservation, Bul. Garden Club of America (1615 Twenty-first St., N. W., Washington, D. C.), Sixth Ser. No. 3, May 1937, pp. 32-40.

Summary of the exploitive phase of Caucasian occupation of the country; the necessity of preserving environment; with regard to predators the author says: "I take no exception to the principle and practice of 'control' where it is really called for x x x Neither do I criticize any man's right to prefer one kind of bird to another, provided he extends the same courtesy to me. But I do say that all the sound, unprejudiced information we have points to the conclusion that most predatory birds have an extremely important place in the scheme of things." Value of preventive in comparison to punitive measures in protecting fishes; evils of drainage; and of oil pollution. "When selfishness and irresponsibility toward any aspect of our common heritage becomes universally recognized as bad form--which is far more important than that it should be merely illegal--then despite the expected increase in human population; the treasures of the out-of-doors may become safe for our children and our children's children, until the end of the world."

Conservation: Abuses of pole traps

Gromme, Owen J. The pole trap, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.), 2(3), March 1937, pp. 20-21.

Pole traps are indiscriminate and destroy some birds of prey that are chiefly beneficial. Notes on food habits of the rough-legged hawk and the marsh hawk. On some game farms 50 beneficial birds of prey worth $250 to the public may be killed in a year.

"Those who use pole traps and particularly the game breeder, must come to realize that there are a far greater number of citizens interested in and vitally concerned with the general public welfare and success of agricultural efforts than those interested in pheasants.

"Pheasants are recognized as valuable game birds (and at certain seasons of the year, insect destroyers) but we must remember that our native birds adequately took care of the insects and furnished excellent game before the pheasant was introduced.

"The state can better afford to furnish ordinary cheap chicken wire covering for open and unprotected rearing pens at game farms, than to sustain the further loss to the public by permitting destruction of the beneficial birds of prey through use of the pole trap."

Conservation: Fur animals

La Budde, Mrs. Edward. The steel trap, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.), 2(5), May 1937, pp. 14-17.

Great decrease in fur animals; condemnation of steel trap; cooperation of fur users in protective measures.

Conservation: History in Wisconsin

Scott, Walter E. Conservation history, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.), 2(3), March 1937, pp. 10-15; 2(4), April 1937, pp. 14-20; 2(5), May 1937, pp. 23-30.

State history with reference to certain species of wildlife, and to definite activities of man affecting conservation. The story is largely a chronological one of official regulative measures with remarks upon their effects on the species involved.

Conservation: South Dakota

[Pugsley, C. W., and T. Hillard Cox]. Recreation in South Dakota (South Dakota State Planning Board, Brookings, S. D., 50 cents a copy), 184 pp., illus., tables, mimeographed, 1937.

Notes on game species of the State briefly noting their history and distribution; a tabulation of reports on destruction of wild ducks by "vermin", indicating crows and hawks as most to blame; the State's wildlife conservation program; big-game and waterfowl refuges in the State (locations mapped); proposed refuge areas; the "vermin" menace; commercial aspects of hunting and fishing.

Conservation: Waterfowl

Brant, Irving. The waterfowl and common sense, Emergency Conservation Committee (734 Lexington Ave., New York, N. Y.) Publication 64, 12 pp., 1937.

Review of the recent history of waterfowl and strong plea for a closed season.

Control: Bounty system

Handley, C. O. Do hawks and owls kill quail?, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md.), 14(2), Spring 1937, pp. 14-18, 7 figs.

Reprint from the Richmond Times-Dispatch in this more available and permanent medium. Definition of the more destructive and the less obnoxious groups of hawks, and plea for discrimination in their treatment. Opposition to bounty payments as being indiscriminate, inviting fraud, expensive, and ineffective. Spending the money for improvement of environment would do quail much more good.

Control: Bounty system

MacDonald, Kenneth F. Necessity for uniform bounties on predators, California Fish and Game (450 McAllister St., San Francisco, Calif.), 23(1), Jan. 1937, pp. 66-67.

Mostly on frauds; gopher skins submitted as those of coyote pups; coyotes raised for bounty; payment of bounties for animals from other States, hence the plea for uniformity. Substitution of the paid hunter system seems not favorably considered.

Control: Deer damage to gardens

Dale, Bonnycastle, Jr. Red deer invaders, Canadian Forest and Outdoors (Montreal, Canada, 20 cents a copy), 33(5), May 1937, pp. 144-145, 1 photo.

White-tailed deer in Nova Scotia, eat practically all garden plants; scarecrows and a watchdog deterred them only temporarily, but a seven-foot fence, the lower four feet with strands 6 inches apart, keeps out the deer, as well as rabbits and porcupines.

Control: European rabbit in Australia

Stead, David G. The rabbit in Australia (Winn & Co., Balfour St., Sydney, Australia. Also obtainable from Ulaws, 42 Torrington Sq., W.C. 1, London, England, 2 shillings, 2 pence), 1935, 108 pp., illus.

The author formerly Special Rabbit Menace Enquiry Commissioner, and author of a previous publication on the rabbit problem in New South Wales, gives the history of the introduction and spread of the animal in Australia. The rabbit now occupies the southern two-thirds of the continent, about 2,000,000 square miles. The animal is termed Public Enemy No. 1. All known methods of control are discussed including fencing (the longest stretch of which is 696 miles), destruction of cover, trapping, poisoning, fumigating, the use of dogs, ferrets, shooting and driving, selective destruction of females, and the use of natural enemies and diseases. The most effective control is fumigation with calcium cyanide. Poisoning is thoroughly condemned because of its destruction of farm stock and wildlife. Diseases have proved useless and natural enemies ineffective. The fur trade tends to sustain the rabbit pest and public lands foster the animals. Concerted action with cyanogas is the author's formula for dealing with the ubiquitous rabbit.

Control: Rodents in Montana

Cates, E. C. Control of rodent pests in Montana, Montana State College Extension Service Bul. (Missoula, Mont.), 151, 32 pp., illus., Feb. 1937.

Range, description, and habits of 12 kinds of rodents and 2 of rabbits, with suggested control measures for each. Distribution maps show the approximate ranges of the Columbian, Richardson, and armatus ground squirrels, and of the prairie dog.

Control: Side hunt for jays

Erickson, Mary M. A jay shoot in California, The Condor (2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 39(3), May-June 1937, pp. 111-115.

A team shoot, the conditions under which carried on, and the results described. Birds brought in were California jays 398, Steller's jays 214, red-tailed hawk 1, Cooper's hawk 1, and sparrow hawks 3. The hunt covered about 200 square miles with a population of one jay to about every 5-1/2 acres or about 11,600 in all. "On this basis the shooting of 612 jays resulted in the destruction of about 5 per cent of the jay population." "A reduction of 5 per cent, even if of annual occurrence, would probably have little effect upon the year-to-year population of jays."

Control: Turtle trap

Anon. Turtle trap at low cost, Coastal Sportsman (P. O. Box 2547, Beaumont, Texas, 5 cents a copy), June 1937, p. 9, 2 photos.

Description of a home made trap that can be constructed at low cost, and is said to be very effective.

Control: "Vermin" problem

Hamilton, W. J., Jr. The value of predatory mammals, Bul. N. Y. Zool. Soc. (New York Zoological Park, New York, N. Y., 30 cents a copy), 40(2), March-April 1937, pp. 39-45, illus.

Regardless of scientific findings, campaigns for "vermin" control still are carried on but there is little evidence that they have resulted in increase of game species. Discussion of food habits of coyote, red fox, eastern skunk, and weasel, and the conclusion drawn that each is more beneficial than injurious in its feeding habits. Examples given of relationships between organisms that may be disturbed to man's disadvantage unless warranted by full knowledge. Value of predators in relation to prey, as fur producers, and controllers of injurious species upon which they feed. Undesirable features of bounty payments. The persecution of "vermin" ordinarily indulged in by sportsmen"is all but baseless and is thoroughly unjustified in the light of cold scientific facts."

Cycles

Baashuus-Jesson, J. Periodical fluctuations in the population of small game, Norges Jeger- and Fisker-forbunds Tidsskrift 2-3(36), 1937, pp. 12-15.

A superabundance of small rodents especially of Microtus in Norway culminating in 1934 led to a considerable increase in predators. The mice abruptly decreased by 1935 and the predators were forced to turn their attention to hares, willow grouse, and other game birds; and the year 1936 was one of the most marked years of scarcity as regards game that had ever been experienced. Eagles, hawks, and foxes are reported even "to have made really desperate attacks on man and animals in inhabited districts."

Causes that may have been responsible for the drop in the mouse population are discussed and epidemic disease is rejected as a primary agency. The true reason for the decrease is thought to be a sudden thaw producing conditions under which the animals are exposed to wet, resulting in freezing and drowning, and also to death due to a combination of loss of body heat and deficiency disease. "Meteoropathology and deficiency diseases first and foremost, not epidemology, ought to be focussed upon when dealing with the problems of fluctuations in the population of small game."

Cycles

Chitty, Dennis H., and Charles Elton. The snowshoe rabbit enquiry 1935-36, Canadian Field Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 51(5), May 1937, pp. 63-73, 3 figs. (maps), 2 tables.

The maps show areas in which increase and decrease in 1935-36 as contrasted to 1934-35, and those in which epidemics were reported in 1935-36. The author's summary is: "595 reports were received from Canada, one from Anticosti and one from Newfoundland. The percentage by area reporting increase has lessened steadily during the five years 1931-36. Decrease values have grown in the reverse manner. Epidemics, after a high incidence in 1934-35 show signs of abating except in the Quebec Peninsula. Although conditions are reported varying from abundance to recovery after extreme scarcity, in most places 1935-36 has witnessed conditions either at or very close to the bottom of the cycle. Abundance is still reported from Anticosti and Newfoundland.

"97 reports were received from the United States, and 3 from Alaska. In the Eastern area of Lepus americanus the cycle appears to have reached its minimum and there is recovery in places. In the Western area of Lepus bairdi and L. washingtoni fluctuations were not well-marked, a high proportion of areas reporting 'no change'. In Alaska, populations were still at high density in most areas, but there were local reports of decrease setting in."

Cycles: Microtus

Hamilton, W. J., Jr. The biology of microtine cycles, Journ. Agr. Research (Supt. of Documents, Washington, D. C., 20 cents a copy), 54(10), May 15, 1937, pp. 779-790, 2 figs., 2 tables.

Review of literature of which a bibliography of 13 titles is presented; all available evidence points to a 4-year cycle for microtines. This study

relates to Microtus p. pennsylvanicus near Ithaca, N. Y. The home range of an individual is small, usually not exceeding 2,000 square feet. Populations ranged from 15-40 to 160-230 per acre at different phases of the cycle. As the cycle waxes there is an increased number of litters per female and an increased number of young per litter. Epizootics, when the mice have reached the peak of their abundance, are the primary agent reducing populations. Cycles are so regular that forecasting periods of abundance is possible; this enables inauguration of control methods before the maximum in population is due.

Cycles: Refuges in relation to

Edminster, F. C. An analysis of the value of refuges for cyclic game species, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(1-2), July 1937, pp. 37-41, 3 tables.

Game populations on refuge areas underwent the same fluctuations as those on a nearby public shooting ground.

Destruction: Pheasants, by hay cutting

Leopold, Aldo. 1936 pheasant nesting study, Wilson Bul. (Morningside College, Sioux City, Iowa, 60 cents a copy), 49(2), June 1937, pp. 91-95, 2 tables.

In a study of 23 tracts of fresh-cut hay stubble, totalling 141 acres in 3 districts of Wisconsin, 42 nests (all but one of pheasants) were found; of these 24, or 57 percent, had been destroyed by the cutting, in 5 cases including the hen. Young rabbits and meadow mice also were killed in numbers. Of the 19 nests destroyed by cutting without known loss of the hen, all were deserted. Crows seem to get most of the eggs exposed by mowing within a few days, especially if the eggs were scattered; some eggs not scattered were never found by crows. Hayfields apparently are nested in for lack of better cover and providing such cover is a good way of keeping the birds out of the fields. Flushing bars are not very useful except where adequate fence-row cover is out of the question.

Destruction: Winter killing

Leopold, Aldo. The effect of the winter of 1935-36 on Wisconsin quail, American Midland Naturalist (University of Notre Dame, Notre Dame, Ind., 50 cents a copy), 18(3), May 1937, pp. 408-416, graphs, tables.

A 11-year cycle is mentioned, the down-grade of which occurred in the years 1932-36. In 1935-36 winter killing on several areas was estimated to run from 30 to 83 per cent. A formula is suggested for expressing the lethal effect of severe winter weather. Fat quail as well as lean were killed by the 1935-36 winter, well filled crops did not avert disaster, and the sexes

perished in about equal ratio. Upon trial no size or size-measurement indices could be developed that were superior for rating emaciation to Errington's diagrams of cross-sections of the breast. There is a bibliography of 12 titles.

Disease: Autopsies

Shillinger, J. E., and Wm. Rush. Post-mortem examinations of wild birds and mammals, U. S. Dept. of Agriculture Misc. Publ. 270 (Supt. of Documents, Washington, D. C., 5 cents a copy), 15 pp., 6 figs., May 1937.

Noting and reporting disease conditions; performing autopsies on mammals and birds; 8 common causes of wildlife losses with notes on symptoms and lesions; preserving specimens for study; shipping specimens and where to ship; safeguarding investigators against infection.

Disease: Eel-grass

Renn, Charles E. The eel-grass situation along the middle Atlantic Coast, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 18(2), April 1937, pp. 323-325.

About the same information as in the article abstracted in WILDLIFE REVIEW, No. 8, April 1937, pp. 7-8.

Disease: Eimeria in flying squirrel

Roudabush, Robert L. Two Eimeria from the flying squirrel, Glaucomys volans, Journ. Parasitology (Science Press, Lancaster, Pa.) 23(1), Feb. 1937, pp. 107-108, 2 figs.

The host an additional genus to be reported as harboring Eimeria. Two species recorded of which one E. glaucomydis is described as new. Iowa.

Disease: Leeches infesting waterfowl

Sooter, Clarence A. Leeches infesting young waterfowl in Northwest Iowa, Journ. Parasitology (Science Press, Lancaster, Pa.), 23(1), Feb. 1937, pp. 108-109.

Theromyzon occidentalis in nostrils of coot, pied-billed grebe, and blue-winged teal. Details of infestation which may have caused some deaths.

Disease: Parasites of ruffed grouse

Connell, Frank H., and H. M. Doremus. Endoparasitism in ruffed grouse near Hanover, New Hampshire, The Auk (3200, 22nd St. N., Arlington, Va., $1.00 a copy), 54(3), July 1937, pp. 321-323.

In 70 grouse, all shot within 15 miles of Hanover, 15 birds had the caeca infested by the flagellate, Trichomonas bonasae. The nematode, Ascaridia lineata, occurred in 22 specimens. The investigation covered 2 years, the second one of grouse scarcity, but there is no evidence that parasitism had anything to do with the decrease.

Disease: Parasites of salamanders

Rankin, John S. An ecological study of parasites of some North Carolina salamanders, Ecological Monographs (Duke University Press, Durham, N. C., $1.50 a copy), 7(2), April 1937, pp. 171-269, 15 figs (graphs), 11 tables.

Field methods; ecology of hosts; lists of hosts with their parasites both for North Carolina and the United States; ecology of parasites; discussion and conclusions; check list of parasites of North American salamanders; keys to these parasites; extensive bibliography.

Disease: Plague in marmots

[Eskey, C. R.] Plague infection discovered in fleas and lice taken from marmots in Montana and in a marmot from Utah, U. S. Public Health Reports (Supt. of Documents, Washington, D. C., 5 cents a copy), 51(34), Aug. 21, 1936, pp. 1159-1160.

First report of plague in marmots in America and demonstration that the infection may be identified in lice and fleas.

Disease: Salmonella pullorum in quail

Emmel, M. W. Pullorum disease in captive quail, Journ. Amer. Vet. Med. Assoc. (221 N. La Salle St., Chicago, Ill., 40 cents a copy), N. S. 42(6), pp. 716-717.

Losses on a Florida quail farm were traced to this cause, the infection being transmitted to a considerable extent in incubators. "While it is not likely that pullorum disease is of particular importance in wild quail at this time, the release of pullorum-infected birds from quail farms is a potential menace to the future welfare of this game bird, particularly at this time, when the restocking of the wild supply is a conservation program of many states."

Disease: Tularemia

Lillie, R. D., E. Francis, and R. R. Parker. The pathology of tularaemia, National Institute of Health Bul. 167 (Supt. of Documents, Washington, D. C., 40 cents a copy), 217 pp., illus., Feb. 1936.

Divided into 14 chapters of which 2 relate the pathology of inoculated tularemia in the house mouse and white rat, and 7 to that number of wild mammals and birds; there are also 2 chapters devoted to briefer accounts of

the disease in miscellaneous mammals and birds. The descriptions of lesions are detailed and well illustrated. There is an extensive general bibliography.

This publication is not an account of tularemia in the wild.

Disease: Worm parasites

Van Cleave, Harley. Worm parasites in their relations to wildlife investigations, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(1-2), July 1937, pp. 21-27.

Universality of worm parasites; possibilities of controlling them; need of study as to what constitutes normal health of animals, as to their parasites and the responsibility of the parasites for pathological conditions, and as to the possibilities of treatment and control when required; suggestions for such studies; instances showing the importance of parasites; quarantine and other control measures; fish parasites; integration of research.

Disease: Addendum: Atebrine vs. Leucocytozoon

Coatney, G. Robert, and Evaline West. Some notes on the effect of atebrine on the gametocytes of the genus Leucocytozoon, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 23(2), April 1937, pp. 227-228.

Drug administered by mouth to an infested great horned owl and a red-tailed hawk seemed to have some effect on the parasites but further experiments are necessary to determine the practicability of its use.

Disease: Addendum: Blood parasites

Wood, Fae D., and Sherwin F. Wood. Occurrence of haematozoa in some California birds and mammals, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 23(2), April 1937, pp. 197-201, 12 figs.

Report on examination of the blood of 203 birds of 21 species and 185 mammals of 18 species. Negative as well as positive cases are cited and for the latter, a considerable variety of blood infesting micro-organisms. The parasites found in thrushes, house finches, wood rats, and meadow mice are given special mention. Bibliography of 5 titles.

Disease: Addendum: Catalog of Leucocytozoon

Coatney, G. Robert. A catalog and host index of the genus Leucocytozoon, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 23(2), April 1937, pp. 202-212.

List of 68 species with date of description, name of author, and host of each; host index; and long bibliography.

Ecology: Animal relations to soils

Van Dorsal, Wm. R. The dependence of soils on animal life, National Association of Audubon Societies (1775 Broadway, New York, N. Y.), 7 pp., May 1937.

Essentially a review of the literature (50 titles cited) of animal relations to soil formation and soil conservation. Author's summary:

"1. Animals that by trampling or other means compact the surface soil tend to increase run-off and, consequently, intensify any erosion hazard that may be present.

"2. Animals that burrow into the soil and thus increase its porosity tend to reduce run-off and thereby decrease the erosion hazard. The latter conclusion is not invalidated by the rare, isolated instances, where through combinations of circumstances often directly traceable to the intervention of man, rodent burrows have been shown to be primary causes of erosion.

"3. In general, animal presence and activities in soils materially assist in the mixing, loosening, aeration, drainage, and fertilization of soils, thereby permitting the increase of plant life, and by a combination of all these factors promote the conservation of soils."

Ecology: Measuring range utilization

Pechanec, Joseph F., and G. D. Pickford. A comparison of some methods used in determining percentage utilization of range grasses, Journ. Agr. Research (Supt. of Documents, Washington, D. C., 20 cents a copy), 54(10), May 15, 1937, pp. 753-765, 5 tables.

Volume by weight, stem count, and ocular estimate methods are described and compared. The ocular estimate by average of plants is preferred for rapidity and relative accuracy. Bibliography of 7 titles.

Ecology: Olympic elk herd

Authors. Stability of animal communities in climax areas, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 34(12), Dec. 1936, pp. 1077-1079.

Three letters. One by Richard H. Pough, National Association of Audubon Societies, urges perpetuation of natural conditions on the Olympic Peninsula, Washington, not only for the benefit of the elk, but also for ecologists to whom preservation of wilderness areas is a great need. C. J. Buck and H. L. Shantz of the Forest Service doubt the feasibility of maintaining natural conditions and recommend management both of trees and of the animals.

Ecology: Survey of game and furbearers of Missouri

Bennitt, Rudolf, and Werner O. Nagel. A survey of the resident game and fur-bearers of Missouri, University of Missouri Studies (Columbia, Mo., cost after free edition is exhausted $1.25 a copy; with reference to free edition, write to authors), 12(2), April 1937, 215 pp., 8 figs.

History of wildlife including extirpations. Development of protective measures in relation to changes in human activities. Charts of open seasons and bag limits show that restrictions in these respects have been applied to all of the principal game species, and in greater degree in quite recent times to half of them. Statement of the methods used in the Survey and of its objectives and limitations. An inventory was impossible so the Survey is frankly extensive and it is limited to the more important species. There is a discussion, with map, of the zoogeographic regions of the State and an annotated catalogue of the important resident game, furbearers, and predatory birds and mammals. The accounts by species treat history; environment; predators, parasites, and diseases; problems of population; and social, economic, and legal considerations; the headings varying according to the available information. There are chapters on 6 game birds; 3 on game mammals (deer, squirrels, and rabbits); 11 on furbearers, including the red and gray foxes; and 7 on predators, treating the house cat, dog, wolf, coyote, bobcat, hawks, owls, and the crow. There is a chapter on administration, also, suggesting a game restoration and management program. Several appendices give recent or other supplemental material. One on breeding reserves and maximal population calls further attention to limitations in the objectives of the Survey. This section includes a table estimating the breeding reserve (1935) of the species treated and the maximal population that might be produced in a year from the estimated nucleus. The report contains a wealth (scarcely suggested here) of detailed information relative to the wildlife of Missouri and provides an excellent foundation for the operation of the new non-partisan Conservation Commission recently provided for by change in the State constitution of Missouri by popular vote.

Economics: Value of fur animals in Michigan

Stobler, A. M. A fortune in predators, Michigan Conservation (State Office Bldg., Lansing, Mich.), 6(10), April 1937, pp. 3-4, illus., tables.

General discussion of biological relationships of predators. Tabulation of furs taken in the 1934-35 season by species, approximately half a million in all; also those shipped in 2 yearly periods 1796-97 and 1800-01 from the post at St. Joseph, Mich. "In any wildlife management program, due consideration should be given to the values of the predatory species."

Education

McConnell, Robert. Attitudes toward certain proposed social actions as affected by defined educational content, Purdue University, Division of Educational Reference (Lafayette, Ind., $2.25 a copy), Studies in Higher Education Bul. XXXI, pp. 70-104, December 1936.

This is the report of an experiment designed to find out whether or not the persons tested were affected by the reading of articles which were designed to influence their attitudes toward defined objects. Those used were: (a) Allowing the Government to tell the farmer how to farm, (b) allowing each farmer to farm as he pleases, (c) clean farming, (d) taxing all the people to plant new forests, (e) draining swamps. The tests were given to school pupils from grades seven to twelve. Results of the experiments showed that there were significant shifts of attitude in the direction intended by the contents of the articles. Tests were given a year later which showed that the changed attitudes persisted with but slight change.

The experiment demonstrates the value of conservation education in the public schools as a means of creating favorable attitudes toward conservation subjects.-Edwin B. Steen.

Education: Agricultural colleges in relation to wildlife management

Bode, I. T. The State College and its place in wildlife management, Connecticut Forester (Conn. State College Forestry Club, New Haven, Conn.), 1937, pp. 7-10.

Wildlife management being a function of land management it necessarily follows that the State agricultural colleges, by virtue of the attention they have given, and must continue to give, to land problems, should be looked to for initiative and leadership. Their favorable position is undisputed but their activities may be in need of stimulation and integration along the lines of research, education, and application in land-use practices. Research on habitat requirements and ecological relationships is a fundamental need, but of equal importance is showing how to make use of the information we do have or can produce in relating wildlife production to land use. The agricultural colleges should lead the way in both of these fields. The economics of wildlife management have not received enough attention and should be made a subject of research, especially in relation to marginal lands. The necessity of better balanced land use is now universally recognized and achievement of such use depends upon better land planning. Agricultural colleges should be leading in this movement and in getting essential information on all phases of the problem to the farmer.

Education: CCC in forest wildlife

Kylie, H. R., G. H. Hieronymus, and A. G. Hall. CCC forestry, U. S. Dept. of the Interior, Office of Education, clothbound, 335 pp., illus., 1937 (Supt. of Documents, Washington, D. C., $1.00 a copy).

Chapter 10, pp. 201-220 is devoted to Wildlife Management. Subheads indicating the contents are: "Classification of Game; Forestry and Wildlife, wildlife and recreation, Wildlife of the past, Wildlife of today; Problems of Game Management; Values of Wildlife; Management of Small Game, Cover, Feed, Stocking, Laws; Management of Big Game, Homes, The Yellowstone herds, Solving big-game problems; Management of Carnivores; Managing Migratory Fowl; Fish

Management, Protecting fish streams, Improving streams and ponds, Planting and restocking, Laws; Summary, The outlook." The book, well made and lavishly illustrated, is an attractive text.

Education: Conservation

Bristow, Wm. H., and Katherine M. Cook. Conservation in the education program, U. S. Dept. of the Interior, Office of Education, Bul. (Supt. of Documents, Washington, D. C., 10 cents a copy), 4, 78 pp., 1937.

Conservation a national policy; conservation and the school program; representative practices in conservation education (7 States); instruction through special circulars and bulletins (3 States); observance of conservation week (4 States); use of experience and activity units in conservation (suggested activities; bibliography); conservation in teacher-education institutions (20 in all); conservation in organizations and agencies (both Federal and non-governmental); general bibliography of 8 pages.

Education: Popular account thrushes and mimids of New Jersey

Hausman, Leon A. The thrushes and mimids of New Jersey, New Jersey Agr. Expt. Sta. (New Brunswick, N. J.), Bul. 618, 32 pp., 27 figs., Jan. 1937.

Summary of food and general habits; notes on identification and range within the State; brief description and illustration of 8 species of thrushes and 3 of mimids.

Education: Wisconsin ecological demonstration

Riis, Paul B. Ecological garden and arboretum at the University of Wisconsin, Parks & Recreation (327 West Jefferson St., Rockford, Ill., 25 cents a copy), 20(8), April 1937, pp. 382-389, 5 photos; 20(9), May 1937, pp. 451-457, 6 photos.

800 acres reserved for preservation of ecological and geographic groups of Wisconsin wildlife and to serve as an outdoor laboratory for cultural students of natural history. In relation to wildlife the plan is to demonstrate the possibility of increasing both number of species and carrying capacity of the range, and to apply biological science sincerely to the solving of biological problems.

Food Habits: Badger

Errington, Paul L. Summer food habits of the badger in northwestern Iowa, Journ. Mammalogy (Wm. H. Durt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 213-216.

Description of habitat and report on analyses of 37 fecal passages, separated into semi-monthly lots. Ground squirrel remains made up about 53 percent of the fecal bulk; mice, 30 percent; and insects (mostly Hymenoptera and

Coleoptera), 9 percent. Discussion of minor food habits and of field observations also is included.

Food Habits: Black bear

Murie, Adolph. Some food habits of the black bear, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 238-240.

Jackson Hole-Yellowstone region, Wyoming. Old and young feeding on crickets and grasshoppers.

Food Habits: Damage to corn

Hendrickson, George O., and Clifford Schlesselman. Wildlife's toll of a food patch of corn, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 236-237.

A field of corn adjoining a wildlife refuge was visited during the exceptionally severe winter of 1935-36 by squirrels, mice, cottontails, rats, and birds. Corn consumed or wasted by cottontails was approximately 3 bushels; that eaten by mice 1 bushel; and that by squirrels 0.8 bushel. The total yield of corn on 2.2 acres was estimated to be 88 bushels. Wildlife harvested about 5.4 percent of the crop.

Food Habits: Deer and elk

Wyckoff, Stephen N. Annual Report Northern Rocky Mountain Forest and Range Experiment Station (Missoula, Mont.) 1936, mimeographed, 77 pp., 1937.

Wildlife research (pp. 49-52) reports progress on studies of food habits of big game mammals, and on numbers and winter movements of deer and elk. Mention is made also of limited work on parasites and diseases and the beginning of an investigation of damage by sheep to upland game birds. The food habit studies were carried out by separating, weighing, and identifying the food items. The ten species of most importance were for deer (59 stomachs): Douglas fir, western red cedar, lodgepole pine, Oregon grape, kinnikinnick, mountain lover, willow, snowbush, serviceberry, and juniper; and for elk (53 stomachs): Wheatgrass, pine grass, bluebunch grass, willow, sedge, June grass, bluegrass, lodgepole pine, serviceberry, and mountain maple.

Studies of utilization yielded some interesting comparative results that may be expressed in tabular form:

Forage Group	Palatability for				
	Whitetail Deer	Mule Deer	Elk	Cattle and Horses	Sheep and Goats
Grasses	35	36	57	57	38
All woody species	17	17	28	13	35
Shrubs	31	31	35	8	24
Coniferous species	24	24	27	0	0
Lichens and mosses	54	54	58	0	0

Food Habits: Food supplies and their utilization

Allen, Durward L. Dinners from weeds, Michigan Conservation (State Office Bldg., Lansing, Mich.), 6(10), April 1937, pp. 5-6, illus.

Preliminary report on a study made on the W. K. Kellogg farm near Battle Creek, Mich. of the food supplies available for wildlife and their utilization. Importance of ragweed, lambs-quarters, foxtail, and other weed seeds to pheasants and quail. The ten leading food supplies for songbirds according to frequency of consumption were ragweed, lambs-quarters, bluegrass (2 species), catnip, redroot, bergamot, sheep sorrel, pigweed, and dropseed. Scientific names of these are given. "Of the species under observation, quail seemd to have the greatest difficulty in finding food."

Food Habits: Mule deer

Robinson, Cyril S. Plants eaten by California mule deer on the Los Padres National Forest, Journ. Forestry (Mills Bldg., Washington, D. C., 65 cents a copy), 35(3), March 1937, pp. 285-292.

Essentially the same material abstracted in WILDLIFE REVIEW, No. 4, June 1936, pp. 7-8, the definite palatability ratings, however, omitted. Bibliography of 5 titles.

Food Habits: Pheasant

Dalke, Paul L. Food habits of adult pheasants in Michigan based on crop analysis method, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 18(2), April 1937, pp. 199-213, 3 figs. (graphs), 11 tables.

This is the first food habits investigation of any extent in the United States that employs the dry weight method. The technique is described. Analyses were made of 352 crop contents. Observations on the period of feeding activity embracing 3,832 pheasants are reduced to the form of a graph, and correlated with average weights of crops collected at various hours. The author's summary is as follows:

"1. Pheasants feed little during the middle of the day, summer or winter.

"2. The crop is not always full when the bird goes to roost, even though food is abundant. Approximately 14 per cent of the pheasants collected at sundown had full crops. In all cases, however, other parts of the digestive systems were full of food.

"3. Habits of feeding are not uniform but are very regular with certain flocks. Areas of wild fruits are completely utilized by daily feeding throughout late fall and winter.

"4. The pheasant is an omnivorous feeder; the greatest variety of seeds and fruits eaten occurred in October when 106 species were recorded.

"5. The high percentage of grain eaten by pheasants is not an indication of damage to grain crops. Most of the grain consumed is waste, either from harvesting or planting, or from manure spread on the fields. Corn, wheat, and barley comprise 83 per cent of all the grain eaten.

"6. In the pheasant territory of Michigan, the most common wild seeds eaten were ragweed, yellow foxtail, skunk cabbage, and green foxtail. Ragweed accounted for 51 per cent of all the seeds eaten. Wild fruits and nuts are eaten consistently, but their percentage is small (7.48), since the habitat of these species are restricted to a relatively small proportion of the pheasant range.

"7. Adult pheasants are not large consumers of insects and other invertebrates in comparison with plant food eaten. The common belief that grasshoppers are consumed in large quantities is not borne out by the investigation."

There is a bibliography of 10 titles.

Food Habits: Prairie pocket mouse

Blair, W. Frank. The burrows and food of the prairie pocket mouse, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 188-191, 1 table.

Perognathus hispidus maximus in Rogers County, Okla. Description of burrows, and tabulation of food stores found in 18 of them. On the basis of frequency, seeds of Gaillardia pulchella and of Opuntia rank as the most important foods. A list is given of 26 identified plant items and there are remarks on the insect diet. Availability is the most important factor in the selection of food.

Food Habits: Rabbit damage to trees

Anon. Damage from rabbits--a consideration in shelterbelt planting, Technical Notes Lake States Forest Experiment Station (St. Paul, Minn.), No. 121, 1 p., multilithed, Jan. 1937.

Table showing trees damaged, and degree of injury, in two plantations in Oklahoma. The species attacked most frequently are the tamarisk, Chinese elm, hackberry, catalpa, desert willow, American elm, and honey locust.

Food Habits: Red squirrel

Yeager, Lee E. Cone-piling by Michigan red squirrels, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 191-194, 2 tables.

Sciurus hudsonius loquax in Saginaw Forest near Ann Arbor. Caches were largely composed of cones removed from the trees by the squirrels; they averaged about 4 bushels each. They were generally located near or under the heaviest bearing trees. Assuming that the animals eat 2 grams of spruce seed per day, it was calculated that the 32.4 bushels of cached cones would provide enough food to carry a population of 65 squirrels through the coldest 5 months of winter.

Food Habits: Red squirrel damaging larch

McCulloch, W. F. Red squirrels attack Japanese larch, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 35(7), July 1937, pp. 692-693.

Of European and Japanese larches grown under apparently identical conditions, the former were undamaged, the latter trimmed to such an extent as to appear stunted by contrast. The larger buds of the Japanese species seem to be the attraction.

Food Habits: Skunk

Kelker, George H. Insect food of skunks, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 164-170, 4 tables.

Review of previous reports, all of which show "that the skunk's food is, to a large extent, composed of insects." The present investigation was of droppings only and the proportions of food items were estimated by volume. Insects averaged a little more than 61 percent of the total volume of some 950 scats collected in three years. Ground beetles, leaf-chafers, and Orthoptera were prominently represented. Economic status of the animals on a sanctuary in Michigan, judged solely on the insect food, was of doubtful positive value in the early part of the season, but of decided positive value for the late summer and fall seasons.

Life History: Field mouse

Hamilton, W. J., Jr. Activity and home range of the field mouse, Microtus pennsylvanicus pennsylvanicus (Ord.), Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 18(2), April 1937, pp. 255-263, 2 figs. (graphs), 1 table.

Author's summary: "Voles are more active by day than by night. The period of greatest activity occurs shortly after dawn and in the hours preceding dusk. Predation possibly plays a selective part in determining periods of greatest activity, for less activity on the part of vertebrate enemies is apparent during early morning and late afternoon. The home range of an individual vole seldom encompasses an area in excess of 1/15 of an acre. 'Homing instinct,' while not developed as well as that in some cricetine rodents, nevertheless permits Microtus to return to its home range when repeatedly liberated at distances varying from one hundred to two hundred and fifty yards."

There is a bibliography of 14 titles.

Life Histories: Flight speed

Cooke, May T. Flight speed of birds, U. S. Dept. of Agriculture Circ. 428 (Supt. of Documents, Washington, D. C., 5 cents a copy), 13 pp., table, May 1937.

Notes on estimated and measured speeds, variation in speed and effect of various factors, a 4 page table chiefly of records of flight speeds but including a few of running; bibliography of 86 titles.

Life Histories: Mountain sheep

Mills, Harlow B. A preliminary study of the bighorn of Yellowstone National Park, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 205-212.

Despite rigid protection, the herds have remained at about the same total number (about 200) for many years. The numbers, distribution, and migrations of ten groups are treated. There are notes on calls, feeding and bedding habits, tracks and sign, reproduction, loss of lambs, food, predators, parasites, and diseases. The most important limiting factor appears to be depletion of winter forage by the elk. Reduction of the wapiti herd is advisable for the sake of those animals themselves as well as for the welfare of the bighorn. Even with that aid, and with ample rainfall, it will take several years to bring the winter bighorn range back to normal.

Life Histories: Pheasant nest mortality

Errington, Paul L., and F. N. Hamerstrom, Jr. The evaluation of nesting losses and juvenile mortality of the ring-necked pheasant, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(1-2), July 1937, pp. 3-20, 1 fig., 8 tables.

Analysis of productivity of the ring-necked pheasant in Iowa based on studies of 503 nests in the years 1933 to 1935. Nesting losses calculated on data of varying completeness run from 59 to 77 percent. Viewed uncritically, these appear alarming, but considering renestings, it is clear that from 70 to 80 percent of the hens finally succeed in bringing off broods. Nestings begun early or late are not so successful as those of the median part of the nesting season. "Success or failure of clutches seemed to bear less evident relation to appraised quality of nesting cover than might have been expected; nor has there seemed to be any clear connection between differences in kinds and numbers of nesting enemies and the intensity of depredations upon eggs as manifested from year to year." As a management measure, creation of new habitats in pheasant-vacant spaces is preferable to improvement of nesting grounds already fairly suitable. The exclusion of livestock from cover and the more judicious control of burning are other practices that may improve nesting conditions.

Life Histories: Red fox; distribution and survival

Errington, Paul L., and R. M. Berry. Tagging studies of red foxes, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(2), May 1937, pp. 203-205.

Of 5 pups tagged and released within two miles of the home den, 2 were trapped the following winter at distances of 16 and 18 miles from their natal locality; the other 3 disappeared. Of 236 young foxes released at some distance from the home range, 16 were trapped or shot during the first, and 1 additional in the second, winter. The distances of the points of capture from those of release varied from 2 to 96 miles. Of 55 foxes released at the age of several months, 10 were reported killed during the following winter. These animals had left their starting points from 10 to 160 miles behind. Iowa.

Life Histories: Skunk

Hamilton, W. J., Jr. Winter activity of the skunk, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 18(2), April 1937, pp. 326-327, 2 tables.

Author's summary: "A study of hibernation of the skunk in central New York was conducted during the winters of 1931-32 and 1933-34. Females are confirmed hibernators; males are more or less active throughout the winter. Low temperatures appear to be the exciting cause of winter sleep. During the mating season, sub-zero temperatures fail to keep skunks in their dens. The data suggest a segregation of sexes during hibernation. While individual adults rarely hibernate for more than a month at a time, immature animals usually sleep throughout the winter, rarely venturing from their dens until mid-March. During winter, males show an average loss of one-seventh of their weight, females a loss of approximately two-fifths their weight."

Life Histories: Vultures, hawks, eagles

Bent, Arthur C. Life histories of North American birds of prey, U. S. National Museum Bul. 167 (Supt. of Documents, Washington, D. C., 70 cents a copy), 409 pp., 1102 pls., June 1937.

Tenth volume of this notable work compiling the published and contributed experience of the author and other ornithologists on the habits, eggs, young, plumages, food, enemies, range, and migration of our birds. The present volume covers the vultures, kites, accipitrine and buteonine hawks, the eagles, and the osprey.

Management: Bobwhite in Texas

Lehmann, V. W. Increase quail by improving their habitat, Texas State Game, Fish, and Oyster Commission (Austin, Tex.), 44 pp., 18 photos, May 1937.

Applying to Texas conditions the work of Stoddard and other writers on quail together with his own very comprehensive personal knowledge, the author has presented a logically arranged, closely reasoned, and well written report that should carry conviction to the farmers and sportsmen of the State. The varying fortunes of the quail as affected by changes in agricultural practice are traced; a definite decline, still continuing, began with the clean-up of farms as one of the methods of cotton boll-weevil control. The usual restocking and vermin-killing nostrums were tried but proved expensive disappointments. On this subject the author remarks: "Food and cover deficiencies are the greatest handicap to quail increase in Texas, and food and cover plants cannot be cultivated with guns, traps, and poison baits. We have yet to see the area in which an increase of quail could be satisfactorily traced to predatory animal control; favorable results from habitat improvement are many." Sanctuaries are no solution of quail maintenance problems because conditions on them change, usually to the detriment of the quail population. The bobwhite is favored by developmental stages of plant succession and, as a rule, repressed by climax conditions. Its management, therefore, consists chiefly in maintaining diversified vegetation with good interspersion of food and cover. Such phases of management as opening woodland, lopping over trees for cover, building brush-piles, strip-plowing, use of fire, and artificial planting are discussed, as is also the relation of grazing to quail. Suggestions are given as to steps in improving habitat in the four major plant formations frequented by Texas quail, namely, the loblolly-shortleaf pine forest, deciduous oak woodland, mesquite-acacia brush, and the tall-grass prairie as well as on small farms. Soil conservation work fits well into quail management and the work of the Texas Extension Service and of the U. S. Soil Conservation Service is commended. The effects of inferior cover and of poor food supply on bobwhites are graphically described; the discussion of carrying capacity brings out the factor of large coveys (150-300 birds) not taken account of in previous theorizing. During the course of the article, important food and cover plants are definitely named. The need of regulated hunting and of farmer-sportsman cooperation is emphasized. There is a summary and a bibliography of 26 titles.

Management: Brush-cutting

Stoddard, Herbert L. Use of mechanical brush-cutters in wildlife management, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(1-2), July 1937, pp. 42-44, 3 pls.

Descriptions, illustrations, prices, and addresses of manufacturers of brush-cutters, machines employed for subjugation of jungle-like growths in the southeastern States. Notes on their use and their value to the wildlife manager in opening up forest and preparing fields for food planting.

Management: Cottontail

Gerstell, Richard. Management of the cottontail rabbit in Pennsylvania, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(2), May 1937, pp. 8-11, 32, 5 photos, 1 pl. (diagram of fox trap); 8(3), June 1937, pp. 12-15, 26, 4 photos, 4 figs. Parts 3 and 4 are available in reprint from the address given.

Parts 1 and 2 were abstracted in WILDLIFE REVIEW, No. 8, April 1937, pp. 19-20; they dealt with restocking with imported animals and checks on the rabbit population. Part 3 reports upon propagation experiments both under a range system that was not satisfactory and under a small pen system that promised better results. This part describes also an intra-state trapping and transplanting scheme that has been an "unqualified success." The cost per animal was about 25 cents or only a fourth of that of rabbits shipped from western States. In furtherance of this system, it is proposed to establish and improve natural propagation areas from which surplus animals will be trapped and distributed where needed. On an area of about 2,000 acres, an average of more than 720 rabbits per year were trapped during a three-year period.

Part 4 deals with food and cover development and with refuges. It contains a good brief discussion of the manipulation of plant succession, names a variety of cultivated crops useful for rabbit feed patches, and gives suggestions for improving cover. Sketches are given for improvement of rabbit habitat. Refuges containing all year rabbit requirements are necessary to the preservation of this animal.

Management: Environmental improvement

Sedam, John B. Environmental controls, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(3), June 1937, pp. 21, 27.

Report on food patch planting on State Game Lands and on the program of environmental manipulation being put into effect. Some of the practices are: release of game-food-producing trees, shrubs, and vines; pronounced thinning of forest stands; restricting planting of evergreens to small blocks; con-

struction of numerous wide fire lanes; removing most large trees from a plot in about every 40 acres of woodland; preservation of all hollow trees; felling browse trees in winter; building brush-piles; selective cutting.

Management: Farm game

Stanford, J. E. Game management on the farm, Southern Agriculturist (Nashville, Tenn.), 67(3), March 1937, p. 17, 1 fig.

A general article cited here to show the interest of a leading farm journal in the subject. Contains no specific suggestions.

Management: Farm game

Wilson, Kenneth A., and Ernest A. Vaughn. The Resettlement Administration and its wildlife program on the Eastern Shore of Maryland, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md.), 14(2), Spring 1937, pp. 1-4, 18-20, 8 photos, 7 tables.

Report on 16 months work and the apparent results; the period covered an unusually severe and also a very mild winter. Raccoons were aided by planting of corn patches, a measure regarded as temporary; release of persimmon, beech, oak, and other food-producing shrubs and trees considered a more feasible method economically, and in the long run. Cottontails were catered to by feed patches of clover and rape and they became patrons also of quail feed patches of soybeans, cowpeas, and buckwheat. Seeds of the plantings were made for quail; the birds responded, and held up well under hunting; pre- and post-season counts of birds on the same area were 202 and 161, respectively. The total population figures for the second winter contrasted with the first represented an 87 percent increase in coveys and a 129 percent increase in individual birds. Expressed otherwise there was one bird to 35 acres the first winter, one to 15 acres the second. [Abstractor's comment: Such studies should be continued long enough to show average results, taking fluctuational phenomena into consideration.] So long as available, the produce of feed patches appeared to be preferred to natural foods. Of 30 quail released in September in environment well prepared in advance, 29 were still living in late February; this too in the entire absence of "vermin" control. Feed patches of annual plants are too expensive for ordinary farm game management so perennials are being tried out. [The instruction as to boiling hard seeds in preparation for planting should be put in more precise form.] Food habit studies were made the first year by dropping analysis, the second by crop content studies; the latter technique is the better but the former is fairly valuable and has the advantage of not requiring the killing of birds. Both methods show waxmyrtle berries and ragweed achenes in the lead by bulk among quail food items; they also predominated in the crop and gizzard contents of 34 mourning doves. Notes are given on various other foods of both of these species of birds.

Management: Farmer-sportsman relationship

Anon. Farm game population increased in trials at Riley, Findings in Farm Science, Wisconsin Agr. Expt. Sta. Ann. Rep. Director (University of Wisconsin, Madison), 1935-36 (1937), pp. 61-62.

"In several areas of Wisconsin this Station is cooperating with sportsmen and farmers to learn what can be done, without too much expense, to restock the land with game. Such projects are underway at Faville Grove, near Lake Mills in Jefferson county; at Riley, in western Dane county; and near Elkhorn, in Walworth county. Similar work is underway at the University Arboretum and on the Station farms near Madison under the direction of Aldo Leopold (Game Management).

"The Riley game cooperative has now been underway for several years, and consequently the experience gained here may be of value to groups planning to launch similar projects elsewhere.

"Ten farmers contribute their land (a total of 2,000 acres) and some labor, while town members contribute the cash costs. The farmers share in all privileges, including shooting, on an equal basis. The group is organized under the shooting preserve law.

"The Experiment Station has kept a record of game stand, plantings, and kill since 1931. During this six-year period quail have increased from 40 to 180 birds. No quail have been planted, and none killed. Pheasants have increased from two to 200; about 100 are planted and some 50 killed each year.

"The record made at Riley shows that a stand of game can be built up, with little cash expense and no interference with farming, despite moderate hunting."

Management: Forest game

Shantz, H. L. Forest Service policy in game management, Calif. Fish and Game (250 McAllister St., San Francisco, Calif.), 23(1), Jan. 1937, pp. 77-84.

General remarks on deterioration of wildlife environment. The national forests were established to conserve the resources of timber, grazing, wildlife, and recreation, for protection of watersheds, stream flow, power, and to prevent soil erosion and floods. They embrace more than 200 million acres, or more than one acre of every ten in the United States. The permanent policy must be to raise this land to its highest social and economic use. The best use may not always be multiple use and certain areas may be exclusively devoted to definite purposes, including wildlife range. Wildlife means all forms of life, and its development and maintenance rests on the environment. Plant cover is basic and should be managed to produce the maximum benefits to wildlife. Overstocking must always be guarded against. In the forests as at present laid out and managed, shortage of good winter range is a limiting factor on game populations.

The Forest Service believes that management can be carried on in cooperation with States. Dr. Shantz said: "Within the limits of our multiple use program we wish to produce the best possible home for big game, upland birds, fish, waterfowl, fur bearers, and other wildlife. We wish to raise the best and largest crop for recreation purposes, hunting, fishing, and trapping. We wish to cooperate in every way with state and other agencies to this end."

"Our purpose is: To raise the forests to their highest potential production capacity; to balance the needs of a multiple use program; to consider the social as well as the economic; to cooperate with state agencies to accomplish these ends and in this way strengthen the wildlife program beyond the forest boundary; to bring every possible agency to aid the program; to broaden our program to increase the protection of species which are in danger of extermination; to encourage citizen organizations by a program of education to join in an attempt to attain for the future the security of a well managed present."

"The watersheds and soils must be protected. To this end we must not permit bad practices in recreation, grazing or wildlife management. We are charged by law with the responsibility of protecting and developing the national forests. To this end we can not allow destruction of the browse or grass cover by overstocking of domestic or game animals. To allow great herds to starve for lack of browse is to repeat the errors of the cattleman and the sheepman. They have paid the price of a lack of a planned program. We do not want to see the wildlife program hampered by a repetition or a continuation of this haphazard practice. There are many unknown facts important to a well managed program but to await the slow process of research before we attempt to apply what we now know would be fatal. We must use these facts and experiences we have at hand and change our policies as fas as necessary in the light of additional research.

"Where laws permit you can help us in making necessary reductions or give additional protection and where they do not permit you to do so we should work together to secure a change. Federal lands must be protected from wasteful and destructive practices but the Forest Service never desires to act alone or independently if it is possible by cooperation with you to avoid such action."

Management: Forest wildlife

Hesley, N. W. Some interrelations of wildlife management and forest management, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 35(7), July 1937, pp. 674-678.

Considers there is no antagonism between the production of trees and of game. "There seems to be no silvicultural operation which cannot influence wildlife to advantage, if properly used." Suggestions as to how cutting, weeding, and thinning may be so managed. Need for interspersion of coniferous and deciduous growths. Releasing of food-producing shrubs and trees and planting of the better kinds advised. Game harvests should be based on repeated censuses. Forest wildlife administrators should be trained in both forestry and

wildlife management. Continued research necessary; danger of generalizing from limited information; local nature of problems, and constant change in conditions Bibliography of 10 titles. Comment: Optimism in this field is no doubt desirable and necessary but so long as planting continues to be largely of solid coniferous stands, and so long as the effect of timber stand improvement operations is to greatly reduce variety of growth in forests and to eliminate den trees and indispensable food species, there is still need for pessimists who will not let these facts be forgotten.

Management: Forest wildlife

Trippensee, R. E. The development and use of state forests in New England in relation to wildlife, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 35(4), April 1937, pp. 403-408.

An optimistic treatment of the forestry-wildlife management problem. "In general good wildlife-management will favor good forestry x x x there need be little or no conflict x x x to neglect wildlife is to fail to use the land to its capacity." "Sustained yield for wildlife is a desirable objective of any balanced land-use policy." Notes on census taking, use of State lands for hunting, trapping, and fishing; environmental improvement; restocking; predator control; refuges; silvicultural operations in relation to wildlife and suggested modifications to favor wildlife. Bibliography of 10 titles.

Management: General

Wallace, Henry A. A product of the soil. As such, wildlife restoration is a problem of land management, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 26(2), March-April 1937, pp. 21, 27-28.

The Secretary of Agriculture's address at the Second North American Wildlife Conference, St. Louis, Mo., March 1937. "As I see it the problem of wildlife restoration is fundamentally one of land utilization." Notes on the program especially in its application to wildlife.

Management: Harvesting

Chapman, Floyd B. Controlled squirrel and rabbit hunting on State hunting preserves, 1936, Ohio Wildlife Research Sta. (Ohio State University, Columbus, Ohio) Release 37, 11 pp., 9 tables, mimeographed, June 1937.

The 1935 report was abstracted in WILDLIFE REVIEW, No. 4, June 1936, p. 15. The area involved, 3 State hunting preserves embracing more than 52,000 acres, is the same and the regulations and checking procedure were much the same. Counts had revealed a decline in the squirrel population, probable causes of which are discussed. Hunters were informed of the condition and only about a fourth as many came as in 1935. "The average hunter spent 4.6 hours in the field, required 3.4 hours to see each squirrel, walked 5.6 miles for each squirrel killed, hunted 6.2 hours for each squirrel bagged, and his expenditure

varied from 90 cents to $6.53 for each squirrel taken." There are notes on weights, ages, sex ratio, and physical condition of some 50 squirrels examined. There is an account also of controlled rabbit hunting on the same areas but this activity is less important.

Management: Harvesting, furs

Yeager, Lee E. Naturally sustained yield in a farm fur crop in Mississippi, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(1-2), July 1937, pp. 28-36, 2 figs., 3 tables.

Trapping through 5 years yielded about the same number of skins each season and a net income that reimbursed the trapper for his time at the rate of 75 cents an hour. One of the tables shows what prices for skins of 5 species were received during the actual trapping period and what they would have brought in other years of differing economic conditions. Management suggestions based on the trapper's experience. Farm fur management can give the small farmer a much needed additional cash crop.

Management: Herd regulation

Hinkley, H. D. The Roosevelt elk of the Olympic Peninsula, Calif. Fish and Game (450 McAllister St., San Francisco, Calif.), 23(1), Jan. 1937, pp. 69-72.

In many areas the elk have destroyed most of their food and in some have become destructive to cultivated crops. Some means of reducing the numbers of animals is required but conflicts in public sentiment make it difficult to arrange.

Management: History

Tripponsee, R. E. Wildlife management in the United States: past present, and future, Forestry Chronicle (Box 43, Knowlton, Quebec, Can., 50 cents a copy), 12(4), Dec. 1936, pp. 375-381.

Broad definition of wildlife management; earliest roots in European game husbandry and forestry; exploitive use of wildlife in North America; realization of the debacle confronting wildlife and struggle to avert it; restrictive, yielding to productive, measures; research, education, and demonstration as at present exemplified. Bibliography of 12 titles.

Management: Improving farm environment for wildlife

Morton, James N. Building better farm environment, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(2), May 1937, pp. 6-7, 28, 5 photos.

Preservation of cover; planting of food producing shrubs and vines; sowing of feed patches; suitable plants recommended.

Management: Planting pond environment

Nagel, Werner C., and Marion W. Clark. Improvement of farm ponds and watersheds for erosion control and wildlife production, University of Missouri Agr. Ext. Circ. (Columbia, Mo.) 361, 11 pp., 6 figs., April 1937.

Improvement of existing ponds and creation of new ones. Planting for wildlife is suggested under 8 categories: shelter and escape cover; protection for dam and spillway; escape and concealment cover and food; swamp nesting and concealment cover; grassy nesting cover; fencerow escape, nesting, and winter cover; food and shelter, oxygen production, for water life; and windbreak.

Management: Range

Anon. Laws and joint regulations of the Secretaries of the Interior and Agriculture relating to the protection and administration of game ranges, or wildlife refuges, established in conjunction with the organization of grazing districts under the Taylor Grazing Act, U. S. Dept. of Agriculture, Bureau of Biological Survey, Service and Regulatory Announcements (Biological Survey, Washington, D. C.), B. S. 86, 5 pp., April 1937.

Regulations concerning protection of wildlife; acts not permitted on game ranges or wildlife refuges; grazing; scientific collecting and investigating; removal of surplus animals; economic utilization of resources; and fishing. Extracts from pertinent legislation.

Management: Red fox

Errington, Paul L. Management of the red fox in Iowa, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 26(2), March-April 1937, pp. 24, 30-31.

General statement of food habits of the red fox and emphasis upon availability as controlling factor in choice of food. Discussion of depredations by foxes on poultry and young pigs. Methods preventing damage are recommended; their cost may be made up for by sale of the skins of foxes trapped on a farm. The conflict between quail hunters and fox hunters is scarcely warranted for it is conceivable that fox populations may be kept at levels reasonably satisfactory to both. On an area harboring numerous foxes, bobwhite losses were at as high a rate on portions of the tract that were hunted over for foxes as on those that were not. Importance of the fox as a fur animal; receipts in Iowa from sales of furs and of pups. Esthetic value; "Other things being equal, the man who would rather look at a fox track in the snow than watch a dog point a covey of quail, or vice versa, should be free to do so, without apologies, explanations, or the risk of being regarded as a crank." In the opinion of the author, however, there are probably twice as many foxes in Iowa as there should be, and it would be to the interests of the people and the foxes alike to lower the present fox population level. Hunting during the season of prime fur is the method recommended. Final paragraph: "I would suggest that we continue to strive for an intelligent understanding of predation as a natural phenomenon. When really severe depredations occur, there is

generally a good reason; and we could well afford to know a little more about what we are trying to do and why."

Management: Refuges

Lewis, Harrison F. A decade of progress in the bird sanctuaries of the north shore of the Gulf of St. Lawrence, Canadian Field-Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Can., 25 cents a copy), 51(4), April 1937, pp. 51-55, 1 fig., 3 tables.

History of the refuges and tables showing the population of the refuges at 5-year intervals. There have been fluctuations both by species and by localities, but also a general trend of increase. These changes and possible causes are discussed in some detail.

Management: Refuges

Zahniser, Howard. A grand tour of the major refuges where the wildlings of the air find sanctuary, American Forests (919 Seventeenth St., N. W., Washington, D. C., 35 cents a copy), 43(6), June 1937, pp. 286-292, 320, 10 photos.

Notes on the Federal migratory bird refuge program, and on the history, development, and inhabitants of 11 of the more important refuges established.

Management: Regulation of animal populations by hunting

Gordon, Seth. Conservation madness, Country Gentleman (Curtis Publishing Co., Philadelphia, Pa., 10 cents a copy), 107(5), May 1937, pp. 16-17, 91-92, 6 photos. Reprinted in Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(4), July 1937, pp. 4-7, 28, 6 photos.

The thesis of the paper, suggested mainly by experience in Pennsylvania, is that "more protection, and more and more restocking x x x will not insure an abundance of wildlife." The history of deer in Pennsylvania is reviewed; from a "shot-out" condition in 1907 the animals increased under protection of refuges and a buck law until by 1922 in some areas they were noticeably encroaching on their subsistence. The difficulty of persuading hunters to shoot does was not overcome until they had 6 more years of experience with increasing depletion of natural food supplies and depredation upon farm crops and orchards. A parallel instance was furnished by beavers once extirpated but reintroduced beginning in 1917 and after that increasing so that it was only over considerable protest that an open season was declared in 1934 and another in 1936.

Reference is made to the overpopulation of deer in the Kaibab and Sun River national forests and of elk and buffalo in Yellowstone Park, control of which also was long resisted. Trapping the animals alive and shipping them elsewhere proved expensive and inadequate. The necessity of regulating the numbers of such animals confined to definite ranges mainly by hunting is

emphasized. Extension of this idea is made to populations of upland game birds in excess of the carrying capacity of the environment and harvesting by hunting is urged of high populations of species of a cyclic nature that are periodically swept away. "What conservation needs most is to rid itself of the blind spot which balks sensible management. Mere protection and more and more restocking where not needed, will never assure a proper abundance of wildlife. Without a favorable habitat, proper food, and cover, and the application of sensible management, we shall never attain our common goal of a well-rounded conservation program."

Management: Ruffed grouse

King, Ralph T. Ruffed grouse management, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 35(6), June 1937, pp. 523-532, 1 fig., 1 table.

Management suggestions resulting from 7 years of study of the ruffed grouse in Minnesota. Besides ordinary variation in number, this species is subject to periodic, and at present uncontrollable, oscillations, which, at approximately ten-year intervals, wipe out about 90 percent of the stock. Shooting of ruffed grouse should be permitted only when the birds are sufficiently numerous and the three major questions in its management are: (1) How can we determine in advance which years should be open?, (2) How can we provide for the greatest number of such open years in every ten-year period?, and (3) How can we provide the greatest amount of grouse shooting during each of these open years? The answer to the first question is careful and continued census-taking, for which a method so satisfactory has been developed that losses in population may be demonstrated in the month of May, amply early for any adjustment of regulations that may be required. The provision of the greatest practicable number of open years is almost wholly a matter of maintaining the maximum breeding population, which in Minnesota is a bird to four acres. This is the April maximum, but to have it there must be a margin in October to cover winter losses of nearly 20 percent. Greater loss indicates deficiency in environment, probably of cover. Providing the greatest amount of grouse shooting during each of the open years is a function of the annual productivity of young. Juvenile mortality is high, normally about 75 percent. Analysis of this loss is given; probably the greatest cause is weakness of eggs due to their production by the hen at a period when the food supply is reduced to the minimum both as to quantity and variety. Any possible improvement of the winter and early spring food supply, therefore, will be highly advantageous. Evergreen herbage, long-persistent fruits, and early spring greens should be encouraged. For the young, more openings should be provided as the herbaceous growth they support is valuable both directly and also for the insects it harbors. Cover is just as essential as food and must be of several types suitable for drumming, nesting, brooding, molting, and wintering. Suggestions are given as to each of these types. Water requirements and how they are met, and the interspersion of food and cover elements also are discussed.

Cyclic declines are not the result of overpopulation and can neither be eliminated or reduced in severity by increased shooting. Every protection should be given the birds from the very beginning of the decline so as to preserve the 4-6 year old individuals necessary for reproduction, and which have also the greatest powers of resistance to the decimating factors.

There are instructions for calculating the permissible take, that is the surplus less the 20 percent margin needed to meet winter losses, and the following general comment on shooting: "It is well to point out in this connection that this so-called allowable shootable take is actually surplus population; it is made up entirely of birds that can not survive the winter. Shooting limited to this part of the population can in no wise affect the continued existence of the species, and it is only when shooting is limited to these surpluses that it can properly be included under the term conservation. No species can be rightly included on the game list unless we know enough about that species to enable it to produce surplus populations and until we can demonstrate that such surplus populations actually exist. It is understood that shooting should always be limited to these surpluses." An excellent boiled-down account of management based on the author's unequalled knowledge of the ruffed grouse in Minnesota.

Management: Seed scarification

Stoeckeler, J. H., and L. C. Baskin. The Denbigh disc scarifier, a new method of seed treatment, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 35(4), April 1937, pp. 396-398, 1 pl.

"The working element is a series of sandpaper-covered discs revolving at a relatively high speed (from 500 to 900 r.p.m.) in a stationary metal cylinder also lined with sandpaper." At 750 r.p.m. a load of 10 pounds of juniper seed was reduced in weight 35 to 45 percent in four hours. Apparatus illustrated and described.

Management: Sexing beavers

Young, Floyd W. The identification of the sex of beavers, Michigan State College Agr. Expt. Sta. (East Lansing, Mich.) Special Bul. 279, 8 pp., 6 figs., Nov. 1936.

Method of holding a beaver for examination, description and illustrations of genitalia.

Management: Stocking, upland game birds in California

Bade, August. California's game farm program, Associated Sportsman (929 Pacific Bldg., San Francisco, Calif.), 3(6), June 1937, pp. 8-10, 10 photos.

Propagation and liberation of Mongolian, ring-necked, Reeves, and Elliott pheasants, Chukar partridges (5,000 released, 600 breeders remaining on State game farms), and Mexican wild turkeys. Effort is to find a suitable bird for each type of country, and in ability to take care of themselves the exotic species seem superior to the native. The Valley quail is an exception and receives equal attention with the pheasant and the Chukar partridge. States that pheasants are not subject to cyclic reduction.

Management: Trapping antelopes

Russell, Paul. Antelope transplanting is success, New Mexico (208 W. Gold Ave., Albuquerque, N. M., 15 cents a copy), 15(6), June 1937, pp. 32, 33, 1 photo.

History of reduction and restoration of the antelope herds of New Mexico. Description of trap and method of using it.

Management: Winter feeding

Anon. Winter feeding stations and foods for ground feeding birds in Michigan, State Dept. of Conservation, Game Division (Lansing, Mich.) Bul. 1, 8 pp., 7 figs., revised Nov. 1936.

Location, construction, and servicing of a variety of types of feeding stations.

Management: Winter feeding

Hawkins, Arthur S. Winter feeding at Faville Grove, 1935-36, Amer. Midland Naturalist(University of Notre Dame, Notre Dame, Ind., 50 cents a copy), 18(3), May 1937, pp. 417-425, 3 tables.

An area of 2,300 acres in Jefferson County, Wis., for which a statistical description, and game censuses both before and after the severe winter of 1935-36, are given. There is a discussion of the value of various sources of winter food as farmyards, crop residues and manure, cornfields, poison sumac, mast, Silphium, Bidens, ragweed, miscellaneous fruits and seeds, and bark and buds. Feeding stations and food patches and the likes and dislikes of game birds for them, are discussed. Experiments to determine palatability of the foods met various obstacles, nevertheless, it was apparent that yellow dent corn was greatly preferred to any other food. Palatability ratings were worked out experimentally for various foods compared to corn; examples are: wheat, 50; barley, 40; feterita, 25; and field peas, 15. Considerable data is presented on amount of grain food required and it is summarized for the most important species as follows: quail, 0.6 lbs. per individual per week; Hungarian partridge 0.75; pheasant, 2.0; rabbit, 1.0; and squirrel, 2.0. The cost of winter feeding per farm was less than five dollars. Feeding definitely increases winter survival. An excellent paper of a type badly needed.

Propagation: Bobwhite

Bass, C. C. Raising quail on a large scale in confinement, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 7(5), May 1937, pp. 4-5, 8.

Report upon a tour of inspection that embraced quail farms in Georgia, Tennessee, Virginia, Maryland, Indiana, and Illinois. Brief notes on equipment and practices.

Propagation: Pheasant

Simpson, Gene M. What the Oregon game farms are doing, Calif. Fish and Game (450 McAllister St., San Francisco, Calif.), 23(1), Jan. 1937, pp. 51-56.

Principal points: Trial of open-topped holding pens for brailed birds; development of a new type combination coop and runway for rearing; production of a strain of brooding hens by crossing Buff Cochin bantams and Rhode Island Red fowls.

Propagation: Pheasant

Wessell, Charles W. Raising your pheasant chicks, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(2), May 1937, pp. 20-21, 3 photos.

Feather and body picking stopped by covering wounds with pine tar and supplying plenty of roosting bars; "rough" appearance of feathers due to overheating; slipped tendons due to too much protein in diet; "loose droppings" treated with two percent mercurochrome solution in water, or by a buttermilk flush; gape worms removed by a commercial inhalant.

Propagation: Vices

Kennard, D. C. Chicken vices, Ohio Agr. Expt. Sta. Bimonthly Bul. (Wooster, Ohio) 22(184), Jan.-Feb. 1937, pp. 33-39, 2 figs.

Although this article relates to chickens, its findings are of interest to game bird breeders. Vices include feather picking and cannibalism, manifested as toe, tail, wing, and vent picking. The great cause is overcrowding, but contributory factors are overheating, overlighting, irregular or insufficient feeding, deficient diet, and the presence of dead or injured birds. Prevention and control measures are discussed. The most effective is debeaking (removal of horny sheath tip of upper mandible) which is described and illustrated.

Propagation: Wild turkey

Russell, V. C. Wild turkeys are grown on Missouri ranch. Birds are used for restocking game preserves, Turkey World (Mount Morris, Ill., 15 cents a copy), 12(5), May 1937, pp. 24, 63-65, 1 photo.

Description of State turkey farm in Reynolds County, Mo. Hens are enclosed in pens guarded against predators but accessible to wild toms. Eggs are hatched in incubators and the young reared in fly-tight brooder houses. The greatest precautions are employed to assure sanitation. The poults are kept in the brooders for about 6 weeks then transferred to range pens. Commercial feeds are used and buttermilk is freely administered.

Research

Hicks, Lawrence E. Wildlife problems in need of research, Ohio Wildlife Research Station (State University, Columbus, Ohio) Release No. 28, 5 pp., mimeographed, 1937.

Need for presentation of results of research in varied forms adapted to different readers and purposes; the man who has done the research is in best position to do this. [Abstracter's addition, "if he can write intelligently"] Means of conveying information to the public. Need of research on groups of related problems, and of the ecological approach; value of the land-use outlook His "theory of substitution" has been expressed elsewhere by the statement that management principles need not vary much from area to area but that the materials used almost necessarily must vary. Usefulness of research in the field of farmer-sportsman relationships. Mention of neglected groups as the mice and shrews. Thorough-going studies of animal populations and of wildlife yields, and originality in research are other needs that are stressed.

Research

Leopold, Aldo. The research program. Scientific research is the rock upon which wildlife restoration must be built, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 26(2), March-April 1937, pp. 22, 28.

Vast expenditures for wildlife are bing made without adequate allotment for research. Suggestions as to needed investigations of waterfowl, rare species, fishes, songbirds, and wild flowers. Research needs not only support but security. Hence it is important: "(1) That donors of funds learn to wait for results, (2) that research personnel be more stringently weeded, (3) that projects be attached to really versatile institutions able and willing to follow where the clues lead, and (4) that research areas be protected against upset."

Wildlife management and education for this profession are now in a "boom" condition and must be brought down to a solid and justifiable basis. A controlling element in the whole movement--the landowners, are being neglected, and their education must at least keep pace with that of wildlife managers.

Research: Miscellaneous results

Leopold, Aldo. The wildlife program of the university, Wisconsin Sportsman (Madison, Wis., 10 cents a copy), June 1937, p. 8, 3 photos.

Brief announcement of findings of research projects. Only 28 percent of 1,341 forty-acre tracts examined in winter of 1932 had enough cover to hold pheasants, and only 9 percent enough to hold any quail. In a bad winter like 1936 a pheasant, rabbit, squirrel, or prairie chicken eats 2 pounds of grain per week, a Hungarian partridge one pound, and a quail half a pound. The preferred foods at feeding stations are, in order, corn, wheat, buckwheat, sorghums, soybeans, barley, oats, and rye. Grazing depletes food plants valuable for wildlife and a part of each marsh and woodlot should be protected by fencing. Cover is deficient on most farms and should be protected from the axe and from fire and supplied where missing. Studies on predator control to date may be summed this way:

"1. We have obtained satisfactory increases in game in some cases without any predator control.

"2. In cases where we failed to get an increase, we find little evidence that 'vermin' were responsible for the failure.

"3. We find in all cases plenty of evidence that predators are preying on the rodents, some of which rob nests, some of which are important enemies of game cover, and all of which compete with game for food.

"4. Where we do encounter evidence of heavy inroads on game, it is always where the game has increased beyond the capacity of the food and cover, as proved by accompanying starvation. Food and cover appear to be better predator control than shotguns.

"5. We do not know of any case where an increase in game has been obtained by predator-control alone."

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-83. Birds in relation to fishes, by Clarence Cottam and F. M. Uhler, May 1937, 16 pp.

A revision of the paper published in the Progressive Fish Culturist for January 1936, abstracted in WILDLIFE REVIEW, No. 3, April 1936, p. 8.

BS-87. Some accomplishments of the cooperative research units, a summary to January 31, 1937, by Hartley H. T. Jackson, April 1937, 10 pp.

List of leaders and their addresses at 9 land grant colleges. Brief note on the progress of organization and investigation at each place.

BS-88. The waterfowl situation: 1936-37, May 1937, 10 pp., 1 table, 3 maps, 1 chart.

Notes on the 1936 breeding ground survey, the fall migration, investigations in Mexico, and the January inventory. Improvement in the waterfowl situation is reported.

BS-91. Research studies in the control of destructive mammals, by F. E. Garlough, May 1937, 12 pp., 3 figs.

Report of the Director of the Denver Control Methods Research Laboratory on conditions favoring pest increase, investigations of habits and control of meadow mice, pocket gophers, other rodents, and coyotes. Methods of control, development of selective poisons, and protection of innocent species.

BS-93. The controlled hunting areas and the pheasant refuge-management system in northwestern Ohio, by Lawrence E. Hicks, April 1937, 10 pages, 1 m

Revision of the paper of same title abstracted in WILDLIFE REVIEW, No. 8, April 1937, pp. 21-22.

SPECIAL ARTICLE

Nutritive value of maize

An interesting pair of palatability ratings supplies the stimulus for this note, long in contemplation. Hawkins (1937, p. 422) uses yellow dent corn, whole, as the standard--100 percent--of palatability of various foods consumed by wildlife at winter feeding stations. Yet yellow dent corn, ground, has a rating of only 35 percent. Thus while the substance was the same, the form in which it was offered made a difference of almost two-thirds in palatability. The ratings therefore cannot be accepted as strictly reliable indications of nutritive value. Corn has been hailed as the most important winter food for wildlife in the upper Mississippi Valley, and as almost a *sine qua non* for winter survival of game birds there, but something needs to be said on the other side.

Something was said very definitely more than 20 years ago but wildlife specialists, not experts in animal nutrition, probably are not aware of it. Rommell and Vedder (1915) say tersely, "Corn is notoriously deficient as a single feed for animals, and it must be properly balanced to be fed satisfactorily." In a recent letter one of these authors, Professor E. B. Vedder, now in the George Washington University School of Medicine, says: "The proteins contain 21 amino-acids, of which 4, tryptophane, tyrosin, lysin, and cystine, are essential to life. Zein, one of the proteins of maize, contains no lysin or tryptophane.

Glutelin another protein of corn contains all the amino acids. But when a single grain is eaten, some of these amino acids are usually deficient in amount and thus growth is stunted. In addition corn is deficient in vitamin A and vitamin B, contains no vitamin C or vitamin D. These deficiencies must be made up by various additions to a corn diet." (Sept. 25, 1936.) The same point is made by Professor E. W. Callenbach of the Department of Poultry Husbandry of Pennsylvania State College, well known for his studies of the nutrition of game birds. He writes, "Nutritional work with all sorts of animals has shown that corn is not satisfactory and particularly with young growing stock where the protein requirement is high. The simple lack of protein in quantity as well as quality is sufficient to render the use of corn alone, impossible." (Oct. 17, 1936.)

Dr. Paul E. Howe, Chief, Animal Nutrition Division, U. S. Bureau of Animal Industry, states, "Corn is generally deficient in the quantity and quality of protein and in calcium. Animals that eat corn and have access to grass do well; a great deal depends on the nature of the green grass. Poultry fed corn with access to range do fairly well." (Sept. 10, 1936.)

John C. Hammond in a report on The McCollum feeding project with chickens (1934, p. 36) states that, "Yellow corn proved to be an excellent base around which to build a diet, although its low and unbalanced protein and low calcium content had to be corrected by some efficient supplement such as dried buttermilk."

Pheasant breeders generally avoid feeding corn to their birds during the period when they are preparing them for the breeding season. They attribute difficulties with corn at this time to its fattening quality, but the trouble may really be deficiency in some element essential to reproduction.

In another field of husbandry, the defects of corn are freely acknowledged F. B. Morrison in his standard text on Feeds and Feeding (20th Ed. 1936) is quoted in the following excerpts, "Corn is also unusually low in mineral matter, especially calcium. Indeed corn has but 0.01 percent of calcium. This means that there is only 0.2 lb. of calcium in an entire ton of the grain. Corn is also lower in phosphorus than oats, wheat, barley, or rye (p. 328). x x x No single fact in stock feeding has been more clearly demonstrated by numerous feeding trials than that corn alone gives exceedingly poor results when fed to growing and fattening pigs (p. 851). x x x Corn alone is just as unsatisfactory for pregnant sows as it is for young pigs. Farmers who persist in wintering their sows on this poor ration have no basis for complaint if their pig crop is a failure." (p. 852.)

It is quite evident that before wildlife managers go in any more enthusiastically for corn they had better "stop, look, listen." As recommended elsewhere, they will do well to obtain the cooperation in their experimental work of experts in animal nutrition.

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1934. The McCollum Feeding Project, Part II., U. S. Egg & Poultry Magazine, 40(12), December, pp. 30-37.

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1915. Beri-beri and Cotton-seed Poisoning in Pigs, U. S. Dept. Agr. Journ. Agr. Research, 5(11), pp. 489-493.

NOTES AND NEWS

I. T. Bode in charge of cooperative work between the Extension Service and the Biological Survey has begun a series of Informational Notes of which No. 1 was issued in February and No. 2 in May, 1937. The table of contents of No. 2 reads as follows: Providing leadership for wildlife conservation, Wildlife conservation in 4-H Club programs, Camping days are with us, The Extension Service and wildlife management, and References to wildlife material.

By an amendment to the National Forest regulations promulgated by the Secretary of Agriculture, the Forest Service is authorized to designate "Vanishing Species Areas" within the National Forests, wherein wildlife species threatened with extinction or rare plant species will be protected. The amendment is designed to protect: "(a) rare or vanishing species of plants or animals, (b) special biological communities, or (c) historical or archeological places or objects of interest." California condors in the Los Padres National Forest in California are among the first beneficiaries of this provision.

Attention was drawn in WILDLIFE REVIEW, No. 5, Sept. 1936, p. 32, to a Pennsylvania law providing for the regulation of roadside menageries. It has since been learned that Connecticut has a law passed in 1923, and revised in 1927, that forbids under penalty, the exhibiting of any wild animal in connection with any business for the purpose of attracting trade.

The National Association of Audubon Societies, 1775 Broadway, New York City, distributes, free of charge, so long as funds permit, the following literature on Persecuted Species: What hawks eat, eastern (single sheet); What hawks eat, western (single sheet); Enter hawk--exit mouse (4 pages); What about hawks (12 pages); Evils that lurk in the bounty system (8 pages); Case of the hawk (4 pages), and a colored hawk and owl poster (14" x 30").

The Association has just issued also a booklet "Ducks for tomorrow" (16 pp., June 1937) that may be of interest to some of our readers. It consists mainly of the views of three authorities on the wild fowl situation. One of these, anonymous, describes general violation of Federal regulations in the Chesapeake Bay region. For California, W. Lee Chambers reports ever dwindling flights and much illegal killing due to inability of hunters to distinguish the protected species of wild ducks, and urges a closed season in 1937. Nash Buckingham, reporting on the middle Mississippi River region, emphasizes the destructiveness of commercial shooting establishments and the gradual extirpation of ducks under the regulations; he suggests closing the season, by injunction if possible, until the waterfowl show a definite upward trend.

The Journal of Wildlife Management published by The Wildlife Society has made its appearance. The Journal is planned as a quarterly and the first issue is styled Nos. 1-2, July 1937. It comprises 48 pages, 3 plates, and various figures and tables and contains a statement of policy, a few short notes, and five articles bearing on wildlife management. These are by Paul L. Errington, Harley J. Van Cleave, Lee E. Yeager, F. C. Edminster, and Herbert L. Stoddard and all are abstracted in preceding pages. Subscription to The Journal of Wildlife Management is $3.00 per year; single copies 75 cents each. Correspondence relative to the Journal or about membership in The Wildlife Society, which includes subscription to the Journal, should be addressed to Victor H. Cahalane, Secretary, National Park Service, Washington, D. C.

The Flicker, published quarterly by The Minnesota Bird Club and formerly mimeographed, is now appearing in printed form. Volume 9, No. 1, March 1937, has 12 pages and a cover. The subscription price is $1.00 per year. Communications should be addressed to the Editor, G. N. Rysgaard, 1400 Capitol Ave., St. Paul, Minn.

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WILDLIFE REVIEW

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Washington, D. C. No. 10 October, 1937

Classification: Clapper rails

Oberholser, Harry C. A revision of the clapper rails (Rallus longirostris Boddaert), Proc. U. S. National Museum (Smithsonian Institution, Washington, D. C.), 84(3018), pp. 313-354, 1937.

Scientific and English names, citation of place of original description, subspecific characters, measurements, type locality, geographic distribution, and remarks, for 25 races of clapper rails of which 8 occur in the United States. No key.

Conservation: Birds in California

Linsdale, Jean M. Preservation of birds in California, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Los Angeles, Calif., 50 cents a copy), 39(5), Sept.-Oct. 1937, pp. 198-203.

An attempt to appraise some of the important influences that affect the preservation of birds in California. The sage grouse is in danger of extirpation chiefly due to devastation of its environment by grazing. The filling in of marshes is doing away with the clapper rail and its associates. The author thinks that shorebirds, ducks, and geese are better off than they were 8 years ago. The California condor is in imminent danger of extinction and several of the rarer birds of prey have too many adverse factors to contend with.

The acreage devoted to agriculture is about the same as it was 50 years ago and there is little need to provide habitat for birds evicted by farming. About half of the area of the State is neither farms nor forests and conditions affecting bird life on it have changed but little. Additional refuges are not needed so much as proper administration of those now in existence.

Bird collectors are few and probably do not seriously affect the avifauna except in a few instances through the collecting of eggs of threatened species for exchange.

In connection with bird control measures the writer says these grew out of mammal control operations, implies that those in charge of bird control work have been active in attempts to forestall a recurrence of the obstacles which impede efforts to kill mammals, and asserts that it is practically impossible to fix the amount of damage done to crops by birds. [Comment by abstracter: In another place in this issue of WILDLIFE REVIEW (Life Histories: Magpies) the same author has been credited with writing objectively, but that remark cannot be extended to the present paper. It is in places very subjective and reminiscent of a highly debatable article published by him some years ago. With reference to the allegations cited in the earlier part of this paragraph, it must be said that control of birds injurious to agriculture preceded that of mammals of the same category in Californian, just as it did in National, history. Bird control by officials in California has been done in a moderate way, corresponding to needs, and certainly without secrecy. Bird damage to

crops often can be very definitely fixed and when it results in total or nearly total destruction, its appraisal may very well include all costs that have been incurred in protecting the crop from other enemies up to the time of its devastation by birds. There is in such instances not a division of losses among various agents but a compounded responsibility of the final depredator for destruction of a perfected and costly product.]

The author suggests that expansion in the field of wildlife management may have been too rapid to be stable, which may be true, but his comparison of wildlife management with that of domesticated animals and his suggestion that it may benefit a few species and be inimical to plants and animals in general, are wide of the mark. Wildlife management is in no wise domestication; it is essentially environmental improvement and in most cases will surely benefit many species besides those for which it was primarily undertaken. The author is of the further opinion that bird protection is losing ground, the attitude of the people swinging to one of indifference or actual disfavor. If this is true in California, it means that the State has not shared equitably in a cultural phenomenon very evident in general, namely, that the sentiment for protection of birds for esthetic reasons has been steadily growing for a long time.

Conservation: History in Wisconsin

Scott, Walter E. Conservation history, Wisconsin Conservation Bul. Wisconsin Conservation Department, Madison, Wis.), 2(6), June 1937, pp. 27-37.

Continuation of the chronological account of the State's activities in conservation, earlier installments of which were noted in WILDLIFE REVIEW, No. 9, July 1937, p. 3.

Conservation: Nature preserves

Selgues, R. Protection de la Nature et Reserves floro-faunistiques [Nature protection and floro-faunal reserves], Revue generale des Sciences (8 Place de l'Odeon, Paris, 6e, France, 5 francs a copy), 47(9), May 15, 1936, pp. 276-280; 47(10), May 31, 1936, pp. 305-312; 47(12), June 30, 1936, pp. 376-380; 47(13), July 15, 1936, pp. 394-403.

Review of National Park programs of the United States and Canada, with notes on the principal areas and their attractions including mammals and birds, and also on their administration and use by the public. Briefer reference is made to similar reservations in Argentina, Brazil, Australia, Japan, Dutch East Indies, British India, Madagascar, Africa, and in several European countries. Description is given of a number of areas in France, preservation of which by the nation is urged. Advantages of nature reserves include; the possibility of complete identification of the biota of an area; diminution of erosion and maintenance of normal stream flow; flood control; conservation of topographic and geological features, and of the flora and fauna; and increase of game by overflow into the surrounding territory. Suggestions are given on the selection of areas and upon their administration after reservation.

Conservation: The waterfowl situation

Anon. Hearing before the Select Committee on Conservation of Wildlife Resources, House of Representatives (House Office Bldg., Washington, D. C.), 75th Congress, 1st session, 60 pp., 3 maps, 1 graph, 1 table, June 1937.

Statements on the water fowl situation by Ira N. Gabrielson and Frederick C. Lincoln of the Biological Survey, Henry P. Davis of the American Wildlife Institute, John C. Huntington of More Game Birds in America, Inc., and Carl D. Shoemaker, Secretary of the Senate Special Committee on Conservation of Wildlife Resources. Mr. Lincoln's presentation included BS-Leaflet No. 88 (abstracted in WILDLIFE REVIEW, No. 9, July 1937, p. 36); reprinting of this leaflet accounts for the maps, etc., noted above. A section of the report is devoted to letters on the waterfowl program and shooting regulations from State Game Departments. Out of a total of 24 of these, 14 express a desire for increased shooting privileges.

Control: Bounties in Pennsylvania

Gordon, Seth. Bounty resolution explained, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(5), Aug. 1937, p. 32.

Brief history of bounty payment in the State and reasons for a change in policy. The wildcat bounty is abolished; that on gray fox continued at $4.00; that on the weasel reduced from $1.00 to 50 cents; that on goshawk reduced from $5.00 to $2.00 on adults, a payment of $1.00 to be made for fledglings, all birds to be killed between November 1 and May 31; and new bounties in these same amounts and for the same season placed on the great horned owl.

Control: Mice in Switzerland

Riis, Paul B. Chemical poisoning of rodents dangerous, Parks and Recreation (Rockford, Ill., 25 cents a copy), 20(12), August 1937, pp. 599-602.

Birds of prey attendant on a mouse plague in Switzerland allegedly killed by secondary poisoning. Campaign condemned for this reason and for ineffectiveness. Recommendations made to canton officials that permits to poison be withdrawn, and all raptors protected. Control of mice in other parts of the country under the personal direction of a qualified technician had better results. Specific mouse serum was used, thus not endangering the lives of predators.

Control: Range rodents

McCampbell, Sam C. Improve your range by rodent control, Colorado State College Extension Service (Fort Collins, Colo.) Circ. 121-A, 8 pp., illus., May 1937.

Instructions for combating prairie dogs, ground squirrels, and pocket gophers.

Cycles

Keen, F. P. Climatic cycles in eastern Oregon as indicated by tree rings, Monthly Weather Review (Supt. of Documents, Washington, D. C., 15 cents a copy), 65(5), May 1937, pp. 175-188, 8 figs., 3 tables.

A masterly discussion with bibliography of 12 titles. Perhaps the most significant sentence for students of cycles is: "As far as can be determined at the present time, there is nothing to indicate that the apparent cycles of growth are anything more than chance variations."

Destruction: Woodland caribou

Cox, W. T. Last stand of woodland caribou, Outdoor America (1167 Merchandise Mart, Chicago, Ill., 10 cents a copy), 2(6-7), May-June 1937, pp. 4-5, 16, 3 photos.

From thousands, the number of caribou in Minnesota has dwindled to 6 at the last count. Slaughter in earlier days, and forest fires and drainage in later times, have been prime factors in the destruction. Drainage ditches trapped the animals, and draining made calving ranges more accessible to wolves which could then readily find the calves. The woodland caribou has also been seriously depleted in Canada, but it now appears likely that some Canadian animals may be obtained for incorporation with the Minnesota remnant in an attempt to perpetuate the species in an environment that is being restored so far as practicable.

Diseases and Parasites: Cestodes of English sparrow

Stunkard, H. W., and John J. Milford. Notes on the cestodes of North American sparrows, Zoologica (New York Zoological Society, New York, N. Y.), 22(2), No. 11, July 16, 1937, pp. 177-183.

Cestodes recorded from Passer domesticus throughout its range; nomenclatorial history of the parasites; synonymy of 2 species reported as occurring in North America; description of Choanotaenia passerina from sparrows collected in Alabama; bibliography of 19 titles.

Diseases and Parasites: Foot-and-mouth, wild animals in relation to

Elton, Charles. Report on faunal surveys of foot-and-mouth areas, in 1934-5, Fifth Progress Rep. Foot-and-Mouth Disease Research Comm. (Ministry of Agriculture and Fisheries, London, England), 1937, Appendix V, pp. 379-386, 1 table.

Essentially a survey as to presence and abundance of wild mammals in infected areas; the evidence as to actual connection of these animals with maintenance and transmission of the disease is negative.

Diseases and Parasites: Fur animal

Shillinger, J. E. Diseases of fur animals, U. S. Dept. Agr. Farmers Bul. (Supt. of Documents, Washington, D. C., 5 cents a copy) 1777, 22 pp., 7 figs., July 1937 (August).

General instructions for sanitary construction and care of equipment, and management of the animals. The infectious diseases discussed are distemper paratyphoid, encephalitis, enteritis, and pneumonia. Internal parasites dealt with include ascarids, hookworms, lungworms, bladderworms, tapeworms, flukes, and coccidia. External parasites commented upon are fleas, lice, and mange mites. Maladies traceable to faults in food and water such as rickets, urinary calculi, food poisoning, and digestive irregularities are given attention, as are also injuries, wounds, and vices. Wherever practicable, suggestions for prevention and treatment are offered.

Diseases and Parasites: Game bird, simple treatments

Anon. Disease: Some simple treatments, I. C. I. Game Researches (Imperial Chemical Industries, Ltd., Millbank, London, England) Advisory Leaflet 12, June 1937, 10 pp.

Not a technical treatise but simple suggestions for the game breeder as to treatment and prevention of gapes, coccidiosis, cramp, pneumonia, sore-mouth and strongylosis.

Diseases and Parasites: Kingfisher trematodes

Harwood, Paul D. Notes on Tennessee helminths III. Two trematodes from a kingfisher, Journ. Tenn. Acad. Sci. (Dr. J. T. McGill, Vanderbilt University, Nashville, Tenn., 50 cents a copy), 11(4), Oct. 1936, pp. 251-25 1 fig.

Key to 4 species of the genus Cathemasia and 5 of Crassiphiala with detailed description of one species in each genus from the host mentioned. Bibliography of 11 titles.

Diseases and Parasites: Muskrat in Great Britain

Warwick, Tom. The occurrence of a disease among muskrats (Ondatra zibethica) in Great Britain during 1934, Journ. Animal Ecology (Cambridge University Press, Fetter Lane, London, E.C. 4, England), 6(1), May 1937, pp. 112-114.

A campaign of trapping by the Ministry of Agriculture and Fisheries brought about great decrease in the numbers of muskrats, but concurrently it appears that there was some natural disease which intensified the downward trend. The lesions in specimens autopsied were of the liver due to roundworms (Capillaria hepatica) of the lungs caused by a haemolytic streptococcus, and of the spleen due to tuberculosis.

Diseases and Parasites: Nematode classification

Dikmans, Gerard. A note on the members of the nematode genus Trichostrongylus occurring in rodents and lagomorphs, with descriptions of two new species, Journ. Wash. Acad. Sci. (350 Ahnaip St., Menasha, Wis., 50 cents a copy); 27(5), May 15, 1937, pp. 203-209, 2 figs.

List of the species of Trichostrongylus recorded from hosts of the groups named; descriptions and illustrations of 2 new American species; key to the group of 7 species; and bibliography of 6 titles.

Diseases and Parasites: Nematode of pigeon

Cuvillier, Eugenia. The nematode, Ornithostrongylus quadriradiatus, a parasite of the domesticated pigeon, U. S. Dept. Agr. Tech. Bul. (Supt. of Documents, Washington, D. C., 10 cents a copy) 569, 36 pp., 6 figs., June 1937 (July).

Of interest to wildlife technicians because the "domesticated" pigeon exists also as a self-maintaining unit of the American avifauna and may share its parasites with any susceptible native species. The present treatment is thorough, giving epizootic and taxonomic history of the nematode, its life history, host-parasite relations, pathogenicity, and control measures. Bibliography of 40 titles.

Diseases and Parasites: Quail malaria

Herms, W. B., and C. G. Kadner. The louse fly, Lynchia fusca, a parasite of the owl, Bubo virginianus pacificus, a new vector of malaria of the California valley quail, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 23(3), June 1937, pp. 296-297.

Experimental proof that this fly can transmit Haemoproteus lophortyx, the cause of quail malaria.

Diseases and Parasites: Snowshoe hare, et al

Green, R. G., and associates. Minnesota Wildlife Disease Investigations (Dept. of Bacteriology, University of Minnesota, Minneapolis), January-June 1937, 6 issues comprising pp. 58-106, Tables 28-55.

These reports on cooperative work between the Department of Bacteriology University of Minnesota, the Division of Game and Fish, Minnesota Department of Conservation, and the Division of Wildlife Research, U. S. Biological Survey, after an interruption, are being issued by the University under the general authorship of Dr. R. G. Green of that institution, J. F. Bell, Minnesota Department of Conservation and Bureau of Biological Survey, Dr. C. A. Evans, C. L. Larson, and C. H. Drake of the Survey, and D. W. Mather on special assignment from the U. S. Forest Service.

The reports are largely on studies of snowshoe hares from the Lake Alexander area, including the results of necropsies, biochemical studies, tularemia immunity tests, and parasite investigations. There are brief accoun of shock disease in the January and February reports when this malady was declining; on quail disease and fox distemper inclusions in the March issue; o further results of the experimental work on non-toxic shot in the April and Ma reports; on chastek paralysis in foxes due to fish diet deficient in Vitamin B in the April number; and on a case of chronic poisoning mistaken for an infectious disease of quail in the June issue.

Diseases and Parasites: Strongylus

Harwood, Paul D. Notes on Tennessee helminths II. Two new species of Strongylus (Nematoda) and notes on the genus, Journ. Tenn. Acad. Sci. (Dr. J. T. McGill, Vanderbilt University, Nashville, Tenn., 50 cents a copy), 10(2), April 1935, pp. 131-141, 1 pl.

Key to 13 species of which 3 are described as new, one from the America rail fence lizard (Sceloporus undulatus). Bibliography of 11 titles.

Diseases and Parasites: Trematode classification

McMullen, Donald B. A discussion of the taxonomy of the family Plagiorchidae Luhe 1901, and related trematodes, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 23(3), June 1937, pp. 244-258, 1 pl.

History of classification of the group; tabulation of known life histories, showing the hosts--a variety of amphibians, reptiles, birds, and mammals diagrams of structure of the genera; diagnoses of this and related families, 2 new; bibliography of 48 titles.

Diseases and Parasites: Trematode life histories

McMullen, Donald B. The life histories of three trematodes, parasitic in birds and mammals, belonging to the genus Plagiorchis, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 23(3), June 1937, pp. 235-243, 1 pl.

Natural infections were found in nighthawk, robin, herring gull, and spotted sandpiper; they are known also in bats and the muskrat; intermediate hosts snails and aquatic insects; bibliography of 7 titles.

Diseases and Parasites: Tuberculosis in wild voles

Wells, A. Q. Tuberculosis in wild voles, The Lancet (7 Adam Street, Adelphi, London, W.C. 2, England, 1 shilling a copy), 232(5934), May 22, 1937, p. 1221.

Author's summary: "The presence of disease, presumed to be tuberculosi in wild voles is reported. The fact that the disease is widespread in the British Isles suggests that this is not a chance infection."

Diseases and Parasites: Upland game bird

Shillinger, J. E., and L. C. Morley. Diseases of upland game birds, U. S. Dept. Agr. Farmers' Bul. (Supt. of Documents, Washington, D. C., 5 cents a copy) 1781, 33 pp., 8 figs., August 1937 (September).

The general discussion pertains to losses among wild game birds from disease and the possibilities of preventing them, and sanitation of game farms including construction, disinfection, and quarantine. The diseases are treated in groups as those due to bacteria and filterable viruses (10), to fungi (2), internal and external parasites (12), to nutritional causes (5). Ant attack, cannibalism, and poisoning also are discussed. So far as possible the accounts deal with the cause and spread, symptoms and post-mortem appearance, and prevention and control of each malady.

Ecology: Census of California sea lions

Bonnot, Paul. California sea lion census for 1936, California Fish and Game (450 McAllister St., San Francisco, Calif.), 23(2), April 1937, pp. 108-112, 1 photo, 3 tables.

Brief discussion of economic status of sea lions and factors in their destruction. Inimical pressure has lessened in recent years; nevertheless the total number of Steller's sea lions for the State is given as 4,900 contrasted to 6,148 for 1927. On the other hand, the California sea lion has increased in that period from 915 to 2,501.

Ecology: Census methods

Lack, David. A review of bird census work and bird population problems, The Ibis (Taylor & Francis Ltd., Fleet St., London, E.C. 4, England, 12 shillings 6 pence a copy), Ser. 14, 1(2), April 1937, pp. 369-395.

Citing 165 references on his subject, many of them summaries in themselves, the writer digests their contents and discusses their implications. The section on The Species Census is an historical index; that on Regional Censuses cites density of population per 100 acres for 28 of them classed in ecological groups. Methods of census taking are discussed and the statement made that "For regional breeding censuses the only reliable method is to locate every breeding pair." Fecundity and mortality studies should be intensified. Of factors affecting bird populations, activities of man, variations in habitat, fluctuations, food, predators, disease, fecundity, behavior, and territorial requirements are discussed.

Ecology: Crow-waterfowl relationships

Kalmbach, E. R. Crow-waterfowl relationships, U. S. Dept. Agr. Circular (Supt. of Documents, Washington, D. C., 10 cents a copy) 433, 35 pp., 3 pls., 15 figs., 6 tables, June 1937 (July).

Report on two-years' investigations in Saskatchewan and Alberta. The areas studied and the methods of investigation are described. The occurrence and abundance of crows on waterfowl breeding ranges is discussed and maps given illustrating the relation of crow range to those of 14 of the more important species of wild fowl. The number of nests studied during the 2 years' field work was 601, of which the complete histories of 512 were recorded. About half of the nests produced young. Crows were charged with destruction of 31 percent of the nests. These and other losses are discussed as a whole and by species, and also in relation to time of occurrence, degree of concealment of the nests, and their local environment. There is an account of the food of crows as revealed by analyses of the stomach contents of 25 adults and 43 nestlings, and comparison of the results with those reached in a general study of crow food in the United States. The availability of duck eggs is reflected in a fourfold increase in the case of adults and a sixfold increase in that of nestlings over egg-consumption figures for the United States. No pronounced mortality of ducklings was found attributable either to crows or other predators. Remedial measures are discussed and emphasis placed on restriction of their application to properly qualified persons.

Ecology: Overpopulation of deer on winter range

Gerstell, Richard. Winter deer losses, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(7), Oct. 1937, pp. 18-21, 29, 14 figs. (11 photos, 3 graphs), tables.

During other seasons the deer are well distributed over available range but in late fall and early winter they congregate and in severe weather seek and remain in stream bottoms. In an area studied, the well distributed late December population had a density of one deer to 14.5 acres, but by the middle of February the same population concentrated by severe weather conditions was a deer to each 1.5 acres. Such a herd appears weather-bound and the animals rapidly lose condition. Food depreciates in quality as well as quantity and the animals not only become emaciated but lose resistance to pneumonia and parasites. Of 3,240 winter-killed deer, 89 percent were fawns, 8 percent yearlings, and 3 percent adults. In experimental feeding it was found that under similar temperature conditions the weight of animals having an excess of food always available varied according to the quality of the diet. Below 40° F. the weight curve of young animals on anything other than ideal food tended to follow the temperature curve.

Economics: Value of muskrats

Bailey, Vernon. The Maryland muskrat marshes, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(3), Aug. 1937, pp. 350-354, 4 photos.

Among natural resources of Maryland muskrats, as an exception, are holding their own due to management. The annual catch is about one million and the best present price per skin $2.00. Good muskrat marshes are as valuable as farm land. Brief notes on humane traps and on habits of the animals. Use of muskrats as food; present price 10 cents a pound for rough-dressed carcasses.

Education: Conservation in public schools, Texas

Stillwell, Jerry E. Conservation and nature study in the Dallas Public Schools (Obtainable from the author, 7460 San Benito Way, Dallas, Texas), 23 pp. (95 x 222 mm.), August 1937.

Arguments for the teaching of conservation including numerous quotations from notables with references. A bibliography includes not only these citations but also the titles and place of publication of general works on the teaching of conservation, recent books on conservation, and texts and other works likely to be of value in connection with its teaching.

Education: Conservation in public schools, Wisconsin

Waddell, J. F., Chairman, Teaching Conservation in Wisconsin Schools, Curriculum Bulletin (Dept. of Public Instruction, Madison, Wis.) 1(1), May 1937, 71 pp., illus.

Reasons for conservation instruction; when and how it should be taught; objectives; what does conservation involve? There are chapters on conservation of the soil, of water, mineral, and scenic and historic, resources, and of forests, wild vegetation, and wildlife, each including teaching suggestions and a bibliography. Appendices give the biography of a quail covey, an outline for wildlife teaching, suggestions as to the preservation of native plants, and a chronology of events in Wisconsin wildlife conservation.

Food Habits: American merganser

Munro, J. A., and W. A. Clemens. The American merganser in British Columbia and its relation to the fish population, Biological Board of Canada (Ottawa), Bul. 55, 50 pp., 10 figs., 5 tables, Sept. 1937.

Summary of investigations, several units of which have previously been reported upon. The life history of the bird is discussed in its bearing on the economics of the species; territorial requirements are touched upon in a section on population studies, and there is a brief statement about restrictive factors. For a study of the food habits 363 "stomachs" were available. Aids to identification of the fish food items are discussed and illustrated. The authors took the unusual but praiseworthy course of studying the food habits of the fishes preyed upon as a guide to appraisal of economic values, and report upon those of 10 species. The findings regarding the merganser and the fishes are presented both by localities and in summary. The outstanding foods of the fish duck are freshwater sculpins, salmon eggs, Salmonidae (char, trout, salmon), and sticklebacks. A great many of the eggs consumed are waste and were evidently dead when eaten. Considering all aspects of the problem in the light of their very thorough investigation, the authors conclude "that the American merganser does not affect adversely the production of trout and salmon to an appreciable degree, because its numbers are not excessive and its food consists to a very large degree of coarse and undesirable fishes." This conclusion does not preclude the idea that control may be locally desirable but

control efforts should be undertaken only where proper biological investigation shows them to be warranted. "When special measures of control are necessary they should be regarded as a corrective for a temporary abnormal condition and not as a permanent policy. In such special habitats as rearing ponds, or where fish cultural activities are concentrated, there always may be a need for continued control. A general reduction of American mergansers on the assumption that at some time or in some place they may cause losses of trout or salmon is considered an unsound and unwarranted procedure."

Food Habits: Bird damage to almonds

Emlen, J. T., Jr. Bird damage to almonds in California, The Condor (W. Lee Chambers, 3068 Escarpa Drive, Eagle Rock, Los Angeles, Calif., 50 cents a copy), 39(5), Sept.-Oct. 1937, pp. 192-197, Figs. 55-57, 2 tables.

Review of previous papers on the subject. Report on study of damage on the University Farm at Davis. The birds chiefly involved were the western crow, California woodpecker, California jay, and red-shafted flicker. At the height of the season the consumption of almonds by birds was over 1,000 a day. The severity of attack upon varieties was about in proportion to the thin-ness of shell. Damage in various orchards varied from 5 to 25 percent which in commercial orchards would be enough to cancel profits. "Fortunately, in the large commercial orchards losses as high as this appear to be exceptional."

Food Habits: Fur seal

Clemens, W. A., J. L. Hart, and G. V. Wilby. Analysis of stomach contents of fur seals taken off the west coast of Vancouver Island in April and May 1935, Dept. of Fisheries (Ottawa, Canada), 20 pp., 3 tables, 1936.

This report of the Canadian Pacific Biological Station is based on examination of 193 stomachs containing food. The distribution of all stomachs collected according to date, size and sex of the seals, amount of food contained and the sealing area is given in one table, and a list of the food organisms identified in stomachs according to day of capture together with total volumetric percentages and frequency of occurrence of the food items in another. Herring composed 84 percent of the food. The consumption of very considerable amounts of commercial fishes is indicated but further investigation should be undertaken. Bibliography of 4 titles of reports on food habits of the same species.

Food Habits: Hawks

Luttringer, Leo A. Hawks--What they eat, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(6), Sept. 1937, pp. 8-9, 3 photos.

Summary of the results of analyses of 347 stomachs of 7 species, chiefly goshawks. The author considers most hawks beneficial, but defends bounty payments that do not threaten extermination of species.

Food Habits: Red fox

Hamilton, W. J., Jr., N. W. Hosley, and A. E. MacGregor. Late summer and early fall foods of the red fox in central Massachusetts, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(3), Aug. 1937, pp. 366-367, 2 tables.

Brief description Harvard Forest, Mass., where the scats analyzed were collected. In 131 representing the period mid-August to early October, cherries occurred 71 times, insects 69, blackberries 45, blueberries 19, cottontails 15, and field mice 12; the frequencies of less important foods also are given. In 36 scats collected in late November, fruits occurred in 20 and mammals in 18. The fruits in the order of their frequency were apples, cherries, grapes, and sarsaparilla and service berries. The mammals were chiefly field mice and cottontails.

Food Habits: Wood rat damage to redwood transplants

Person, Hubert L. Commercial planting on redwood cut-over lands, U. S. Dept. Agr. Circular (Supt. of Documents, Washington, D. C., 10 cents a copy) 454, 39 pp., 15 figs., 16 tables, July 1937.

Wood rats are important among factors limiting survival of planted redwoods in northwestern California. Rodent destruction in which they are chiefly responsible sometimes involves from 35 to 50 percent of the transplants.

Life Histories: Fur animals of California

Grinnell, Joseph, Joseph S. Dixon, and Jean M. Linsdale. Fur-bearing mammals of California, their natural history, and relations to man, University of California Press (Berkeley, Calif., $15.00 per set of 2 volumes) I, xii + 1-375 pp., col. pls. 1-7, figs. 1-138; II, xiv + 377-777 pp., col. pls. 8-13, figs. 139-345.

This is a natural history of the fur animals of California, based as largely as possible on intrastate data. The manuscript was submitted for publication in 1933, hence is not strictly up-to-date. The work deals with 68 species and subspecies of mammals, mostly carnivores and rodents. Technical information, while condensed, is presented with the accuracy and detail demanded by the systematist. A point is made of citing both scientific and vernacular names in addition to those adopted as standard. The natural history of the species consists of observations of the authors, testimony of trustworthy observers, and usually to a considerably less extent of quotations from the literature. Special attention is given to the presentation of accurate weights. Food habits are treated as definitely and fully as possible. The value of the fur, the status of the species in the California fur trade, and a summary of the animal's relations to man from all points of view are included in each account. The work is well illustrated and the colored plates by Allan Brooks afford most readers a better idea of the appearance in natural surroundings of the animals portrayed than they are ever likely to gain from personal experience.

General discussions relate to the history of fur trapping in California, present-day trapping, effects of fur mammals upon man, and of man upon these animals, population trends in the fur-bearers of California, and fur farming in the State. The fur trade in California, as in most of the United States and Canada, was an important factor in early history; organized collection of furs in California began in 1786. In the chapter on present-day trapping, statistics compiled from reports of licensed trappers are given on the number of animals caught, average prices, number of trapping licenses issued, percent of trappers reporting, and value of furs by species, from 1920 to 1924. The largest class of trappers is believed to be schoolboys and being under age are not required to have licenses or report their catches. The discussions of economic values have a conservation trend. The subject is complex and the authors conclude that "Persons who appear to have solved the problem have usually arrived at conclusions without the aid of facts sufficient to reveal the true nature of the situation. There has been a widespread increase in the alarming practice among some wild-life administrators of instituting regulation which actually cause more serious conditions than those that they are trying to remedy" (p. 19). Prejudice against animals in general and especially against the large ones which appear to compete with man is an important element in governing public policy and is something that can be overcome only gradually and by education--to which process these volumes are a distinguished contribution.

In the chapter on population trends, 17 factors deemed responsible for a general decrease in California fur-bearers are discussed. The authors believe that poison put out for squirrels is the chief cause, both directly and indirectly, of depletion of the fur-animal populations in many localities, especially in the southern half of the State. The account of fur-farming is by no means optimistic, much less so than could with justice be written for various American States and Canadian Provinces in the general region of the Great Lakes

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The work is well done and/two handsome volumes will grace the shelves of any naturalist as well as serve indefinitely as the most valuable source of reliable information upon the fur animals of California.

Life Histories: Magpies

Linsdale, Jean M. The natural history of magpies, Cooper Ornithological Club, Pacific Coast Avifauna 25 (2068 Escarpa Drive, Eagle Rock, Los Angeles, Calif., $3.50 in paper covers, $4.25 cloth bound, a copy), 234 pp., 8 pls. (1 col.), 20 figs., tables, Aug. 1937.

Synthesis of a very detailed compilation of all kinds of information about magpies of the world with especial emphasis on the American forms on which the author has done considerable field work. Taxonomy, distribution, habitat relations, food and feeding habits, migration, nesting territory and courtship, nests, eggs and incubation, history of the young, anatomy, plumages and molts, general habits, populations, relations to other animals and to man are the principal groupings under which the material is arranged. A list of 422 vernacular names from numerous languages and more than 20 pages of bibli-

ography testify to the thoroughness with which the literature was examined. On account of limited power of flight magpies are closely bound to adequate cover; in general they are little migratory; they do not manifest strong "territorial" monopolization; mating apparently is for life; about three-fourths of the food is animal, including birds' eggs and nestlings, and flesh torn from living large mammals, besides items of opposed economic classification. The treatment is objective, facts being advanced or quoted without rationalization.

Life Histories: Muskrat breeding

Errington, Paul L. The breeding season of the muskrat in northwest Iowa, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(3), Aug. 1937, pp. 333-337, 2 tables.

Bulk of births in May, June, and July; two litters per female the usual number, three not infrequent; young do not breed in year of birth; gestation period apparently variable, possibly from 19 to 30 days.

Life Histories: Oven-bird

Hann, Harry W. Life history of the oven-bird in southern Michigan, Wilson Bulletin (Dr. T. C. Stephens, Morningside College, Sioux City, Iowa, 60 cents a copy), 39(3), Sept. 1937, pp. 145-237, 11 pls., 5 tables.

A report based on 3 full and 2 partial seasons of field work of modern type; it is one of the best of published life histories and doubtless the best for any species of American warbler. The text is arranged under the following main headings: Territorial and sexual relations, singing, nest, eggs, nestlings, fledglings, departure, reproduction and survival, and the cowbird in relation to the oven-bird. The last cited section is presented in considerable detail and it shows the cowbird to be responsible for the loss of 18 percent of the total number of eggs, chiefly by direct removal. Nevertheless the oven-bird is not considered a very favorable host for the cowbird.

The paper contains findings that should give theorists pause such as that "choice of mates appears to be only a matter of chance," "there is some contention and fighting between males, but no injury was ever noted as a result," "Copulation between non-mated birds is common," and "Parents continue to swallow the fecal sacs to some extent as long as the young are in the nest." The first three of these findings cast an unfavorable light on the hypothesis of sexual selection, and the last on that of protective adaptations under which certain caterpillars and spiders are supposed to gain advantage by resemblance to bird droppings.

Life Histories: Sage grouse

Girard, George L. Life history, habits, and food of the sage grouse, Univ. Wyoming Publ. in Science (University of Wyoming Press, Laramie, Wyo.), 3(1), pp. 1-56, 5 pls., 12 tables, Sept. 1937.

Despite the limited period of intensive field work he enjoyed, the writer has been enabled by his general knowledge of the species, and by ingenuity and diligence to bring together in this paper a surprising amount of detailed information on the sage grouse. Descriptive notes and measurements are original, and the statement of range, although necessarily compiled in part contains up-to-date local data by the writer. About half of the vernacular names cited are here first recorded, but through some slip 7 of the older names from the literature are given as in present usage.

So condensed is the account of courtship, nesting, and component or related phenomena that abstracting is scarcely feasible. Migrations, molts, growth, general habits, social life, and their elements also are concisely treated. Food is described and tabulated in as much detail as warranted by Biological Survey analyses of the contents of 33 stomachs and crops collected in July and August in a single county. True to what is generally believed more than seven-tenths of the food consisted of composite plants, mainly Artemisia or sage-brushes and allies. The effects of predators, poison campaigns, and grazing on the birds are discussed as well as the outlook for conservation of the bird in Wyoming, including a suggested plan for management. The findings and conclusions are summarized, and although the paper surpasses, in the amount of original data, all that has previously been published on the sage grouse, the author regards it as only a basis for continued investigation.

Life Histories: Snowshoe rabbit sex ratio

Webb, William L. Notes on the sex ratio of the snowshoe rabbit, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(3), Aug. 1937, pp. 343-347, 1 fig., 1 table.

Economic tendencies: negative as destructive to tree plantings; positive as a game and buffer species, and as material for the study of cyclic decimations. The sex ratio in 3,920 rabbits trapped during a period of 5 years is shown in table and graph by months and years. The percentage of males varied from 45.7 to 55.5 in the lows and highs corresponding to those of the cycle.

Life Histories: Speed of mammals

Biddle, Nicholas. The speed of mammals, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(5), Aug. 1937, p. 19.

General discussion and speedometer records showing the best rate per mile of the pronghorn antelope 43 m.p.h.; race horse 36; greyhound 30; jack rabbit 28; red fox 26; coyote 24; fox hound 22; and gray wolf 20.

Management: Dust and grit requirements

Anon. Grit and dust, I. C. I. Game Researches (Imperial Chemical Industries, Ltd., Millbank, London, England) Advisory Leaflet 3, 8 pp., table, 2 pls., August 1937.

This replaces the original No. 3, abstracted in WILDLIFE REVIEW, No. 3, April 1936, p. 26, and as stated on the cover has been completely revised. Section headings indicating the contents are: Grits found in partridges and soils, the right kind of grit, buying grit, dusting shelters, and gritting and dusting stations. The plates illustrate typical grits used by 6 kinds of game birds and a dusting shelter.

Management: Farmer-sportsman relationship

Anon. More farm game cooperative programs, Izaak Walton League of America (Merchandise Mart, Chicago, Ill.), 6 pp., mimeographed, March 1937.

Value of farmer-hunter cooperation; landowner organizations; notes on plans tried in Ohio, Michigan, and Iowa; the sportsman's part; where aid can be obtained. References to 8 pertinent publications. Sample signs suitable for use on cooperative hunting areas.

Management: Farmer-sportsman relationship

Conklin, W. Gard. Status of the farm game refuge program, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(7), Oct. 1937, pp. 6-10, 4 photos, 2 maps, 1 table.

History of the program; statistics on number of projects (19), their location, number of farms involved (288), and acreage (21,982); the movement definitely under way only since 1936 is said to be developing nicely. Details are given as to acreage of safety zones in 8 of the projects. Flushing bars were furnished to 12 cooperators who report the saving of numerous nests by their use. Food patches and woody cover and food plants were set out to improve conditions on the farms. Farmers are not paid in cash but are recompensed in incidental ways, which are enumerated.

Management: Farmer-sportsman relationship

East, Ben. Can we save free hunting?, Outdoor Life (Popular Science Publishing Co., Dayton, Ohio, 15 cents a copy), August 1937, pp. 13-15, 56, illus.

Viewpoint of farmers said to demand protection from trespass abuses more than cash. Trial of leasing land by State Board of Fisheries and Game in Connecticut and its loss of popularity described. Description of this State's regulated public hunting plan under which the farmer grants hunting rights to the Board, the latter agreeing to enforce hunting regulations, plant game, and protect the farmers from vandalism; no money payments are involved. 120,000 acres are reported under this plan. New Jersey is buying and developing public shooting grounds but also has a cooperative plan much like that in Connecticut that applies to 129,000 acres. The New Jersey system provides for safety zones of from 400 to 600 feet radius about farm buildings.

Management: Feed patch planting in Michigan

Tubbs, F. F., and G. W. Bradt. The planting of food patches for wil life, Game Management Circular 1, Michigan Department of Conservation (Lansing, Mich.), 4 pp., 1 fig., 2 tables, all unnumbered, revised 1936.

Suggestions as to suitable strains of crop plants, preparation of soil and seedbed, rate of seeding. Comment on value of the various kinds as cover and food. Formula for the Williamston seed mixture. Brief hints as to valuab fruit-bearing shrubs.

Management: Flushing bar

Anon. How to save birds and their young, Izaak Walton League of America (Merchandise Mart, Chicago, Ill.), 2 pp., illus., mimeographed, 193

Description and sketches of this device to save birds, nests, and eggs from destruction by mowers.

Management: Harvesting seals

Colman, J. S. The present state of the Newfoundland seal fishery, Journ. Animal Ecology (Cambridge University Press, Fetter Lane, London, E.C. 4, England), 6(1), May 1937, pp. 145-159, 3 figs., 2 tables.

The Harp seal (Phoca groenlandica) and the Hood seal (Cystophora cristata) are involved but the former is by far the most important. History o the industry from about 1750 is reviewed and the methods of hunting described. The numbers of animals taken by the crews of schooners from 1815 to 1862, and of steam vessels from 1863 to 1936, are tabulated, analyzed, and graphed. The average value of the catch is around $300,000 per year. In the author's opinion the seal herds, at the present rate of kill, are not decreasing, but may be increasing slowly, though they are still far smaller than they were before 1850. The trends of the business should be carefully watched and if necessary controlled. [The only excuse for calling the business a "fishery" seems to be that it is carried on by fishermen.]

Management: Herd reduction, Pennsylvania deer

Gerstell, Richard. Why antlerless deer seasons are necessary, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(6), Sept. 1937, pp. 4-5, 4 photos.

The much discussed Pennsylvania deer problem is largely a food supply problem. Following widespread lumbering leaving much brushland favorable for deer, second growth in the sapling and pole stages greatly reduced ground growth so essential to the deer. The result has been heavy overbrowsing, detrimental not only to the forest but to farms, to certain species of small game, and to the deer themselves. These animals are stunted in their general size and antler development and fewer of the does bear twin fawns than normally Open seasons on antlerless deer are being tried as a means of reducing the herd in the hope that the starvation of the animals and depreciation of the range can be halted.

Management: Introduction of birch cock

Hofbauer, George. Birch cock or black grouse, Hunter-Trader-Trapper (372 S. Fourth St., Columbus, Ohio, 15 cents a copy), 75(2), Aug. 1937, pp. 19-20, 1 photo.

Lyrurus tetrix; description; habits, sporting value; history of attempted introductions from Phillips (U. S. Dept. Agr. Tech. Bul. 61, 1928); suggestions for further trial; the bird recommended as "the last word in wariness."

Management: Maintenance of a stock of partridges

Anon. Partridge stocks and mortalities, I. C. I. Game Researches (Imperial Chemical Industries, Ltd., Millbank, London, England) Advisory Leaflet 13, June 1937, 9 pp.

Digest of Middleton's papers on partridge populations (abstracted in WILDLIFE REVIEW, No. 1, Sept. 1935, p. 12; No. 3, April 1936, pp. 13 and 26; No. 8, April 1937, p. 11) for the benefit of proprietors and keepers of partridge ranges, especially as to estimating the numbers of birds prior to the shooting season and regulating the kill so that there will be enough survive winter losses to provide the number of breeders needed for the following season.

Management: Range

Dayton, Wm. A., et al. Range plant handbook, U. S. Dept. of Agriculture (Supt. of Documents, Washington, D. C., $2.50 a copy). Pages not consecutively numbered, probably about a thousand. 1937. Copiously illustrated with line drawings, photographs, and colored cuts.

Conventional bibliographic citation for this book is not readily given as it is merely the bound edition of a Handbook prepared for loose-leaf filing and for enlargement in the future. The plant accounts are grouped as of grasses, grasslike plants, range weeds, and browse, and each species or group of species has devoted to it what amounts to a separate leaflet; these rather than their pages are numbered, which may be 2, or more. Each plant treated as a species or as the representative of a group is figured in a good line drawing, photograph, or colored illustration on the same page with paragraphs descriptive of its structures. Accounts of the plants include standard scientific and vernacular names, local appellations, notes on the plants' range, abundance, ecology, and palatability for grazing animals, and often on utilization by wildlife, poisonous or medicinal qualities, and other interesting features or associations. The work is the fruition of a long-time compilation by many people (13 are given author status) and condenses into handy form an almost infinite amount of detail regarding range plants; it at once becomes a necessity to all having to work with these plants.

Management: Refuges, Federal

Anon. Wildlife and the land. A story of regeneration, Committee Print (Senate Special Committee on Conservation of Wildlife Resources Senate Office Bldg., Washington, D. C.), 75th Congress, 1st session, 90 pp., 16 figs., 5 tables, 1937.

An account of the waterfowl and big-game refuge program of the Biological Survey, with description of the refuges, notes on the wildlife frequenting them, and improvements that have been made since their acquisition.

Management: Squirrels in Texas

Goodrum, Phil D. Wise use of forested lands necessary for squirrel conservation in east Texas, Progress Report, Agr. Expt. Sta., Division of Wildlife Research (College Station, Texas), 459, 4 pp., 1 map, mimeographed Aug. 1937.

Notes on a method of estimating numbers of squirrels. A density of 2 or more to the acre is considered good. Natural breeding schedule. Overshooting, unrestricted timber cutting, overgrazing, and drainage are the principal inimical factors (all traceable to man, be it observed). The ways in which they affect the animals are described. Recommendations are given for restoring and increasing the squirrel population.

Management: Statistics as an adjunct

Conner, Geraldine. Fish and game statistics, California Fish and Game (450 McAllister St., San Francisco, Calif.), 23(2), April 1937, pp. 113-118, 1 pl.

A building especially designed for the statistical branch is described and illustrated; it was occupied in January 1937. It is equipped with electrically operated tabulating machines. Types of statistics handled are described, including reports on the kill of deer kept since 1927, and on other game since 1935. The results are of great value to the Department of Natural Resources in combatting activities and proposed legislation dangerous to the wildlife of the State.

Management: Stocking upland game birds in California

Bade, August. Eleven years of progress at the California State Game Farms, Calif. Fish and Game (450 McAllister St., San Francisco, Calif.), 23(2), April 1937, pp. 98-107, 5 photos.

Combination of information from articles previously abstracted in WILDLIFE REVIEWS No. 4, June 1936, p. 18, and No. 9, July 1937, pp. 31-32.

Management: Watering and winter feeding

Anon. Winter feeding and watering, I. C. I. Game Researches (Imperial Chemical Industries, Millbank, London, England) Advisory Leaflet 14, 12 pp., Aug. 1937.

This leaflet contains a revision of information presented in the original edition of Leaflet No. 3 (see a preceding abstract, Management: Dust and grit requirements) on the use of food oils, on water supply, and especially on winter feeding. Under prevailing conditions partridges, taking what they can get, have too much greens and not enough grain in the winter diet. Regular daily feeding of a grain mixture is urged and formula is recommended. The principal vegetable foods for various seasons are listed; a great majority of them are plants known as weeds in the United States. The leaflet contains sections also on where to feed, feeding during nesting, feeding vs. disease, partridges and water, and dewpan drinking trays.

Propagation: Chachalaca

Healy, James C. Breeding the Mexican chachalaca, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 7(9), Sept. 1937, pp. 4-5, 2 photos.

Notes on care of birds and a few young that were reared.

Propagation: Fur animals

Ashbrook, Frank G. The breeding of fur animals, U. S. Dept. Agr. Yearbook (Supt. of Documents, Washington, D. C., $2.00 a copy) 1937 (September), pp. 1379-1395, 7 figs.

The 1937 Yearbook, like that for 1936, is largely devoted to genetics. The present title is that of the only contribution to these volumes from the Biological Survey. The author's theses are that research is needed to throw light on the breeding habits and gestation periods of fur animals so that an intelligent conservation program may be based on their biological needs, and that breeding research is needed to give a more certain foundation for the production of fur animals in captivity. The article includes a brief history of the fur industry in the United States and a short statement of the production and demand for furs. The genetical discussion is presented under the following headings: Reproductive cycles, raising fur animals in captivity, production on fox farms, present breeding methods, market requirements, research on inheritance in the fox, genetic relationships between red, cross, and black foxes, and a suggested program for further research.

Propagation: Irradiation results, bobwhite

Bissonnette, Thomas H., and Albert G. Csech. Night lighting with bob-white, Bird-Banding (Chas. B. Floyd, 95 South St., Boston, Mass., 50 cents a copy), 7(4), Oct. 1936, pp. 168-170.

From authors' summary: "Increasing the daily period of exposure to light between December 16th and June 19th up to five hours per night with electric light from a 60-watt bulb induced a pair of Quail to begin to lay fertile hatchable eggs from March 22d onward. Controls began to lay at the usual time on May 19th. x x x This method may be used to obtain early chicks from Quail for restocking depleted game preserves."

Bibliography of 6 titles, all by the same authors.

Propagation: Irradiation results, raccoon

Bissonnette, Thomas H., and Albert G. Csech. Modification of mammalian sexual cycles, VII--Fertile matings of raccoons in December instead of February induced by increasing daily periods of light, Proc. Royal Soc. London, Ser. B. (827), Vol. 122, pp. 246-254, April 1937.

From authors' summary: "By increasing the daily periods of illumination from 10 October onward, three male raccoons were induced to become sexually active in December and to mate with two females each, similarly brought into oestrus in December instead of February.

"Three of the females were successful in rearing young during the previous season, and they again gave the same number of young under the experimental lighting (four, one and three, respectively) as under normal conditions in the previous year, with and without continued lighting after the last 2 weeks of gestation (this, in spite of subzero weather). So lactation and maternal instincts were normal.

x x x

"The breeding season of the raccoon may, therefore, be advanced 40 days by increased daily exposure to light in autumn. Young ones, so produced, were successfully reared through early spring months, grew as well or better than those born at normal dates, and reached maturity of size earlier than usual."

Propagation: Pheasant, care of young

Kellogg, H. B., Jr. Pheasants--their care and treatment, Wisconsin Sportsman (2004 Winnebago St., Madison, Wis., 10 cents a copy), 1(11), July 1937, p. 2, 1 photo.

Suggestions on the prevention of feather, body, and tail picking; regulation of brooder temperatures; signs of disease and what to do; and the importance of green food.

Research: Trapping and ringing technique

Chitty, Dennis. A ringing technique for small mammals, Journ. Animal Ecology (Cambridge University Press, Fetter Lane, London, E.C. 4, England), 6(1), May 1937, pp. 36-53, 5 figs., 9 tables.

A trap for live captures and the rings used for marking the animals are described and illustrated; the bands are like those used in bird study, except that they are of nickel to reduce damage by gnawing; they are put on the hind legs of the animals. Previous studies of small mammal movements are reviewed, and the author's work on the long-tailed field mouse (Apodemus sylvaticus) and the bank vole (Evotomys glareolus), reported. The paper is especially concerned with technique and its modification so that the results obtained shall reflect, so far as possible, normal activities of the mice. Movements of the animals named were recorded up to 480 yards in the case of the field mouse and up to 300 yards in that of the vole. Variations in movements occur seasonally and with the sexes of Apodemus. "In making estimates of animal numbers, differences in activity may be a complicating factor. Determination of the true extent of the home range of each species is likely to be a problem of some magnitude." Bibliography of 12 papers, half of them American.

Wildlife technology and its social significance

Anon. Technology and wildlife, National Resources Committee [report on] Technological Trends and National Policy (Supt. of Documents, Washington, D. C., $1.00 a copy), June 1937, pp. 135-136.

Condensation of the material presented in Leaflet BS-67, "Wildlife Technology," by W. L. McAtee, which was abstracted in WILDLIFE REVIEW, No. 7, Dec. 1936, p. 29.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLET

A single issue of interest to wildlife managers additional to those previously mentioned is listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-94. Status of eelgrass (Zostera marina) on the North Atlantic Coast, by John J. Lynch and Clarence Cottam, July 1937, 15 pp., 1 table.

Review of the decline of eelgrass in 1931 and of the subsequent history of the plant; summary of conditions by States up to date of publication. Report on experimental plantings. [Supplements BS-3, "The present situation regarding eelgrass," abstracted in WILDLIFE REVIEW, No. 1, Sept. 1935, p. 30.]

SPECIAL ARTICLES

Birds feeding on mulberries

Two lists of birds that feed on mulberries (references at the end of article), published years ago, contain the names of species additional to those for which mulberry-eating is known from stomach analysis. The value of field observation in complementing laboratory study of stomachs is obvious and in some cases gives us about all the information we have as to the use of certain food supplies. In the wildlife management field, making observations that will most

valuably supplement recorded information on food habits is an opportunity of field workers that should not be neglected.

Field observations have altered the impression as to the value of mulberries as a "decoy crop," attracting the attention of birds away from cultivated fruits. While under certain circumstances they may have this effect, under others they may be ineffective, or may even favor increased damage. At any rate it has been found in California field investigations that copious food supplies encourage local concentrations of birds near cultivated crops and may be the factor responsible for serious damage.

In the following list of birds (63 species) known to eat mulberries, the initials following the names indicate as authorities: H = Holt, M = Merriam, and BS = Biological Survey.

Wood duck	BS	Eastern bluebird	BS, M
Lesser scaup duck	BS	Cedar waxwing	BS, M
Ruffed grouse	BS	Phainopepla	BS
Bob-white	BS	Starling	BS
Dowitcher	BS	White-eyed vireo	BS
Yellow-billed cuckoo	M	Red-eyed vireo	BS, H, M
Eastern flicker	BS	Warbling vireo	M
Gilded flicker	BS	Yellow warbler	M
Red-bellied woodpecker	BS, H	Cape May warbler	M
Red-headed woodpecker	BS, H	Bay-breasted warbler	M
Hairy woodpecker	BS	Oven-bird	BS
Downy woodpecker	H, M	Yellow-breasted chat	H
Eastern kingbird	BS, H, M	English sparrow	BS, M
Scissor-tailed flycatcher	BS	Baltimore oriole	BS, H, M
Crested flycatcher	BS, H	Orchard oriole	BS, H, M
Eastern phoebe	M	Boat-tailed grackle	BS
Least flycatcher	M	Purple grackle	BS, M
Eastern wood pewee	M	Common cowbird	M
Blue jay	BS, H	Western tanager	BS
White-necked raven	BS	Scarlet tanager	H, M
Common crow	BS	Summer tanager	H
Fish crow	BS	Cardinal	BS, H
Black-capped chickadee	BS	Rose-breasted grosbeak	BS
Carolina chickadee	BS	Black-headed grosbeak	BS
Tufted titmouse	BS	Indigo bunting	H
Mockingbird	BS	Purple finch	M
Catbird	BS, H, M	Common goldfinch	M
Brown thrasher	BS, H	Eastern towhee	BS, H
Robin	BS, M	Chipping sparrow	M
Wood thrush	BS, H. M.	White-throated sparrow	H
Hermit thrush	BS	Song sparrow	BS, M
Olive-backed thrush	BS		

Doubtless the names of numerous species remain to be added.

The references to papers on the subject are:

Holt, Ernest G.
1918. Birds and mulberries, The Auk, 35(3), July, pp. 359-360.
Locality: Prattville, Ala.

Merriam, C. Hart
1891. Birds which feed on mulberries, U. S. Dept. Agr. Rep. 1890, p. 285.
Localities: Westchester County, N. Y., and Department of Agriculture Grounds, Washington, D. C.

Subject heads for a bibliography of Lemmals, By D. A. Mac Lulich

The following description of a card file of mammalogical references is presented as an example of technique and of classification of references that may be useful to mammalogists and wildlife specialists. This file was developed while the author was studying the varying hare at the Department of Biology of the University of Toronto under the direction of Prof. J. R. Dymond, Director of the Royal Ontario Museum of Zoology. Assistance received from the University and Museum staffs, and particularly from Prof. Dymond, is gratefully acknowledged.

POLICY: The bibliography was primarily an index to literature dealing with mammals that are found in Canada, and secondarily an index to papers on biological principles and their applications that are of interest or use to mammalogists. The intention was to include all locality records of mammals in Canada and also sufficient records from the neighboring states to list all species found near Canadian borders. Foreign records and general notes to be included only as they are of special interest.

CLASSIFICATION OF MAMMALS: Families and larger units are arranged according to "A new classification of mammals," by G. G. Simpson (Bul. Amer. Mus. Nat. Hist., vol. 59, art. 5, pp. 259-293, 1931). Genera and species are arranged alphabetically.

FORM: Cards 3x5 inches; top line, at left, author; at right, year, above the year, subject heading; second line (or lines), title, not specially capitalized; next line, reference in full (for publication, however, it is customary to take only volume number and pages); below the reference an abstract, summary, note or quotation may be given. Guide cards with 5 tab positions are used.

SUBDIVISIONS OF THE FILE: Primarily classified by subject; subdivided where desired by geographic districts and by systematic headings. Within each division the cards are filed alphabetically by authors. General papers and books are listed first under each subject heading, followed by those filable under sub-headings and specific references. Yellow cards are used for the subject headings, blue for the geographic headings, and salmon for the systematic headings. Major subject headings as continents and orders of mammals are on tabs in the first position at the left. The subdivisions use the other four positions--family headings on the second position tabs and species headings on fourth position tabs. Many books and some papers covering a wide field may not be

abstracted in detail, but simply cited in the general sections of the larger subject divisions. Therefore it must be remembered that the references to a particular subject will be found in two places; under the detailed subject (or species) heading and under the general section preceding it. The major subject divisions used are the following:

Periodicals Examined.

Bibliographic References.

General Works on Mammals. See also under Ecology, General, and Taxonomy.

Taxonomy, and Systematic Mammalogy. No geographic headings. Subdivided by order and sub-order, family and sub-family, genera and sub-genera, species, sub-species (the 5 card positions).

Palaeontology of Mammals. Geographic and systematic sub-divisions.

Evolution. Systematic divisions only.

Anatomy. Subject divisions; general, myology, osteology, histology, cytology, biometry (measurements, growth), pelage, tracks, scatology. Systematic headings within each subject as needed.

Embryology. Systematic sub-divisions.

Reproduction, Breeding. Systematic sub-divisions.

Physiology. Systematic sub-divisions.

Genetics. General, hybridization, statistical, heredity of special characters such as pelage. Systematic sub-divisions.

Psychology. General, "intelligence", sociability. Systematic sub-divisions.

Ecology. (1) General; (2) Studies, life histories and general works on groups or species; (3) Relations to environmental factors as light, heat, fire, mortality from automobiles, trains, etc., effects on environment; (4) Habits, actions. Systematic sub-divisions. Sub-heading: territoriality, or home range (5) Domestication, captivity, conditioning. Systematic sub-divisions; (6) Food Systematic sub-divisions; (7) Associations, plant and animal; habitats, succession. Systematic sub-divisions; (8) Diseases, parasites, deaths, epidemics. General, followed by some systematic headings, then geographic divisions with systematic sub-divisions. (Note: Taxonomic and other studies on parasites, bacteria, etc., will be found in the auxiliary files of those subjects, apart from the mammalogical bibliography.) (9) Population. General, with some systematic sub-divisions (see Distribution and Abundance for specific local records); Predation, Systematic sub-divisions (classified by prey); Competition, Systematic sub-divisions. (Note: See also auxiliary file of Population

physiology.) (10) Spread, Migration. Systematic sub-divisions; (11) Animal Geography: (a) General followed by some general references under geographic headings; (b) Surveys, Lists. Geographic divisions; (c) Distribution and Abundance, specific records. Geographic divisions and Systematic sub-divisions.

Conservation. General and some systematic sub-divisions.

Management. (1) General; (2) Information, Economic mammalogy. General and systematic sub-divisions; (3) Methods and definite plans for management. General and systematic sub-divisions; (4) Mammal culture, farming, raising. Systematic sub-divisions; (5) Introduction of exotics. Geographic headings with systematic sub-divisions; (6) Administration: (a) Activities of administration as organization of personnel and comparison, reports; (b) Statutes, regulations.

Utilization. (1) General; (2) Hunting; (3) Trapping, general and systematic sub-divisions; (4) Fur trade; (5) Fur industry; (6) Whaling; (7) Technique of preparation of skins.

Technique. Some definite methods of use in management, censuses, osteology, microscopy, etc.

It was desired to keep certain useful references that did not form a part of a mammalogical file. These were kept in the following auxiliary files: 1. Ornithology, 2. Parasitology, 3. Bacteriology, 4. Mycology, 5. Pathology, 6. Biochemical Tests, 7. Plant Ecology, 8. Miscellaneous Ecological Studies, 9. Population Physiology, 10. Miscellaneous Cycles, 11. Mathematics, Statistics.

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Canada.

Massachusetts wildlife program, By Harold M. Bradbury

Massachusetts has three distinct ecological zones: the eastern or seacoast, the central or Connecticut River valley, and the western or Berkshire Mountain. Each of these calls for different treatment, and any policy drawn to cover this state must be flexible enough to provide for all three.

There are also different conditions to meet on our tide marshes than are found in states lying to the south. Our marshes average 10 feet level and our range in high tides is from 7.1 to a flood tide of 12.1, giving a variation of 5 feet, and our ebb tides run from -2.2 to +1.8. These conditions are entirely dissimilar to those existing in most of our Atlantic seaboard states and consequently call for different treatment in carrying on a waterfowl and shorebird restoration program.

Under Commissioner of Conservation, Ernest J. Dean, there have been set aside 16 wildlife refuges, totaling 9,455 acres, the largest comprising 1,600 acres and the smallest 150 acres. Seven of these have been mapped, work plans for them drawn, and actual development started. On two of these areas, develop-

ment has been uninterrupted since February 1935 and has continued on the others also with the exception of short layoffs due to emergency flood work or lack of funds.

Following our policy for the "Selection, Development, and Maintenance of Wildlife Refuges," under the head of "Fire Prevention" we have constructed or improved 43.7 miles of graveled fire lanes and built 50 waterholes. To supply cover we have planted 247,650 three-year old nursery grown coniferous trees in scattered groups adjacent to feeding grounds and at other advantageous points, and we have piled slash to provide temporary escape cover wherever desirable. 7.3 miles of food strips have been cleared, cultivated, and planted, and 42.75 acres of food patches established. Predator control has been carried on successfully with emphasis being placed on the maintenance of escape cover. Winter foods have been improved by planting, transplanting, grafting, and pruning, involving a total of 20,000 persistent-fruit-bearing shrubs and trees, including 2,839 Malus grafts. A total of 847 acres of woodland has been treated to improve composition, with hardwood-softwood groups as the objective. A main nursery for the propagation of food and cover shrubs and trees has been established, as well as branch nurseries in all wildlife areas where it was deemed expedient.

Census is taken twice each month by the grid line system, our lines being run at 400-foot intervals N. & S., E. & W.; observations are made alternately, N. & S. lines being run on the first and E. & W. on the fifteenth of the month or vice versa. Stream improvement has been carried on by the installation of dams, checks, and deflectors, and by cleaning or installation of gravel for spawning beds at springholes, a total of 2.02 miles of trout stream having been treated. Twenty-five ponds have been created, some allocated to fishing and others to waterfowl restoration. Preferred aquatic plants have been set out in some of these waters, and this type of improvement will be continued.

In our tide-marsh waterfowl and shorebird restoration development, we have coordinated with the Massachusetts State Reclamation Board, our efforts having been directed toward restoring potholes and shallow-water mud flats that had been drained through mosquito-control operations. This work has further restored environment for the killifish that eat mosquito larvae and are in turn consumed by many species of wading and swimming fowl; it has also supplied migratory waterfowl with much needed resting stations.

Summarizing, we find that all species of wildlife are materially increased by these operations. This is particularly noticeable of cottontail rabbits in areas that have been developed for a period of two years or more. Grouse increased slightly (about 10%) despite the recent cyclic decline of this species. Deer resort to the refuges during the open season without reducing the kill, 1936 having been one of our largest years in take of deer. Wild turkeys are doing well, with three broods (hatched from stock liberated prior to August, 1936) under observation at Beartown Wildlife Area, the only place where restocking of this species was attempted. From a total of seven known muskrats on Bog Pond in 1934, the increase required twenty-two lodges last

winter. This was brought about principally by closing to trapping and lowering the pond. Benedict Pond, built in 1934 and planted to giant wild rice and wapato, supported seventy black ducks during the fall of 1936.

Our tide-marsh experiments have led to the discontinuance of drastic and complete drainage by mosquito-control authorities in this state. We have proved that mosquito control and waterfowl-shorebird restoration can be carried on successfully with the same operation. Non-game species have increased tremendously, particularly song and insectivorous birds. Rides or food strips sown to cereals, clovers, and other legumes are very desirable, resulting in the breaking up of the forest density, extension of rimrage or edges, sweetening of the soil, and the creation of dusting sites and food supplies through cultivation.

Census as we take it by grid lines, traversing all types of topography and flora, has proved extremely valuable in ascertaining the preferred seasonal environment of the different species. The grid lines themselves act as breaker strips and runways in what we have found to be a very desirable spacing, namely, 400 feet.

In general the best predator control is obtained by providing escape cover as an integral part of the feeding grounds. There are no bounties except for wildcats. Where we have eliminated red-tail and red-shouldered hawks, the less desirable Cooper's hawk has come in. After observing a red-tail kill a Cooper's hawk immediately after it had been placed in the same pen, the experiment was tried of encouraging the Buteos in the wild.

Composition improvement has materially increased the cottontail and grouse population as well as that of desirable non-game species.

From observations taken and findings arrived at over a two and one-half year period, we feel confident that we are building on a sure foundation, and we intend to continue and expand until those who control privately-owned lands see how beneficial our work has been and join wholeheartedly with the State in a Wildlife Restoration Program. When that day arrives, wildlife will realize that "More Abundant Life" so often spoken of but so seldom enjoyed.

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NOTES AND NEWS

Legislation providing for Federal aid to States in wildlife-restoration projects was passed by the recent Congress and approved by the President, September 2, 1937. It authorizes the Secretary of Agriculture, beginning in the fiscal year 1939, to aid such States as have assented to the provisions of the Act and have passed laws prohibiting use of hunting-license fees except for wildlife conservation, in such wildlife-restoration projects as he approves.

It authorizes an annual appropriation equal to special excise taxes on sportsmen's equipment (estimated at $3,000,000 annually) for apportionments to States for this purpose, and permits the Secretary to use not to exceed 8 percent of such fund for expenses and administration of this Act and the Migratory Bird Conservation Act, and also amounts apportioned to States from such fund but not used, for carrying out the provisions of the Migratory Bird Conservation Act. Submission of an annual report to Congress on the disposition made of money authorized to be appropriated by this Act is required. The Act is an authorization, not an appropriation, and no funds are yet available to carry out its provisions. They must be appropriated annually and it is hoped will be provided so that the program may get under way July 1, 1938. Meanwhile preparations are being made by the Biological Survey and the States.

Protection of Whales. In 1931 there was an international agreement for the conservation and restoration of whales, the treaty being ratified by the Senate of the United States in 1935, and enabling legislation passed in 1936. In June of the present year an international congress was held in London for the purpose of modernizing and improving the previous treaty and the draft signed by representatives of 9 nations was ratified by the Senate on August 5. It will come into force when ratified by a majority of the signatory governments and may be adhered to later by any other interested countries. The treaty protects Gray and Right Whales at all times, forbids the killing of young whales or of females accompanied by young, and also the taking of Blue, Fin, Humpback, and Sperm Whales under certain specified lengths. There are detailed regulations for conduct of the whaling business designed to insure conservation of whales and full utilization of those killed. Observance of the treaty is to be secured by the presence of an official inspector of whaling on each factory ship under the jurisdiction of the contracting governments. Arrangements are suggested for continued study of whaling and adjustment of regulations to the needs of the animals.

A mimeographed leaflet of 10 pages on "Preparing Scientific Manuscripts for the Biological Survey" is available for distribution outside of the Bureau. Several hundred copies were used by the Soil Conservation Service and the National Park Service, and the leaflet can still be obtained by individuals upon application to the Biological Survey.

Land use adjustment programs being carried out in Washington, Oregon, and Idaho will benefit native game and wildlife, according to information from Resettlement Administration (now Farm Security Administration) Region XI.

In Oneida County, Idaho, ideal game conditions for sage hens and prairie chickens particularly are being created by the withdrawal of 133,000 acres of unsuccessful wheat lands from agricultural use, and by restoration of vegetative cover through erosion control, reseeding, and range management. The

program will also extend to some 250,000 acres of adjacent public domain.

In Tillamook, Yamhill, Douglas, Lincoln, and Lane Counties, Oregon, grouse, deer, elk, bear, and other species will profit from the withdrawal of 73,000 acres of land from agricultural use. An additional 1,125,000 acres of public domain are included in the area to be developed.

Grouse, mule deer, bear, and other wildlife will be protected by similar programs in Stevens and Pend Oreille Counties, Washington, where 340,000 acres will be withdrawn from cultivation and restored to forest and forage cover. About 310,000 acres of public domain land will be part of the development area.

Planning for improved game and wildlife is being done in cooperation with the Forest Service and the Bureau of Biological Survey, U. S. Department of Agriculture. (U. S. D. A. Land Policy Circular, Aug. 1937, pp. 3-4.)

The long-continued campaign, sometimes a necessarily militant one, for suppression of the cattle-fever tick, is well known. Its principal implement is the dipping-vat and where domestic stock, only, carried significant infestations, dipping has resulted in the practical eradication of the cattle tick except in a few counties in Texas and six in southern Florida where the ticks are kept going by undippable deer populations. "Last month," so Time (30(12), Sept. 20, 1937, pp. 66, 68) informs us, "Florida decided the deer would have to be killed." "This summer the ticks got so bad in x x x Orange, Osceola, Polk, Charlotte, Hendry, and Collier counties that the Florida State Livestock Sanitary Board scheduled for last week a gigantic deer hunt. Hired hunters were to kill some 1,000 deer in the quarantined area. At this point, the Florida Deer Protective Association promptly protested, pointed out that the State could not control the hunt because no provision had been made for fencing in the quarantined area. The huntsmen also pointed out that such wholesale hunting would be unsportsmanlike. The Association got a restraining order against the State, which last week decided to postpone the hunt indefinitely."

"Transactions of the regional conference of wildlife technicians, February 18-19th, 1937," Ithaca, New York, 83 pp. 1937, mimeographed through the courtesy of the Pennsylvania Game Commission and the New York State Conservation Department.

This report is not abstracted in the regular way as it is not available for extensive distribution. It may be consulted, however, in libraries of institutions engaged to any considerable degree in wildlife investigations. Brief comments on included papers follow.

Work of the Biological Survey in the Northeast, by W. B. Bell, pp. 6-10. A description of the organization and work of the Survey with special emphasis on the Division of Wildlife Research. The handling of transplanting material,

a survey of farm wildlife management, and the effects of silvicultural operations on wildlife are some of the topics treated.

Wildlife program of the National Forests in the northeastern United States, Region 7, by Barry C. Park, pp. 12-16. This paper deals chiefly with hunter expenditures, the game drive counting method, and stream development.

Progress of wildlife management in the Soil Conservation Service, Region I, by Philip F. Allen, pp. 18-21. Maintenance of vegetative cover on the land is the objective; strip-cropping, tree- and shrub-planting, grazing control, cover management, and feeding stations are discussed in their relation to wildlife.

General outline of the wildlife restoration work carried on by the Resettlement Administration, by A. L. Lamson, pp. 23-25. Conditioning land for wildlife before turning it over to the proposed administrative agency is the function of this service. Maintenance of good environment, especially of areas selected as wildlife feeding plots, and planting of deficient environment are sample activities. Cooperative projects relating to deer, rabbits, and woodcock are mentioned.

Development of submarginal land for game in New York State, by Ben O. Bradley, pp. 26-34. Nine areas totalling some 30,000 acres are being developed for wildlife by the Resettlement Administration. Work is based on thorough surveys and includes mixed planting of open land, providing for continuance of the advantages of brushland, and for good distribution of food and cover in woodland. Swales, streams, and ponds receive special treatment. A year's operations are summarized.

Activities of the National Park Service, Wildlife Division, in New York, Pennsylvania, and New Jersey, by Dan P. Beard, pp. 35-37. Federal work on national parks and monuments, and cooperative work on State reservations. Wildlife receives complete protection in 80% of the parks in the 3 States mentioned. Continuous management of sanctuaries to keep them effective. Correlation of human and wildlife occupancy of parks.

Pennsylvania's game administration program, by Leo Luttringer, Jr., p. 38 Reorganization of force, small refuge program, State game farm program, rabbit management, and the educational program are briefly mentioned.

Progress in Massachusetts, by Harold M. Bradbury, pp. 40-42. Composition improvement in hardwood sprout growths apparently brought about immediate increase in the population of cottontails and ruffed grouse. Making holes to new low levels and still allowing surface water to drain off marshes brought back shorebirds and some waterfowl and still maintained mosquito control.

A resume of New York State's game program, by J. Victor Skiff, pp. 43-47. Organization of the work in five branches, game research, management, distribution, and propagation, and game conservation education. Notes on experimental propagation of ruffed grouse, introduction of Reeves' pheasant, restocking of

quail, winter feeding of deer, and other research. Effects of conifer planting on game. Cooperation with some 700 sportsmen's clubs; educational work in schools.

Raising game food plants, by Sherman W. Eddy, pp. 48-49. Local value of various shrubs; collection of seeds and cuttings for transplanting to areas where needed.

A critical analysis of the value of refuges for woodlot game, by F. C. Edminster, pp. 50-54. Practically the same paper as that entitled "An analysis of the value of refuges for cyclic game species," abstracted in WILDLIFE REVIEW, No. 9, July 1937, p. 7.

The farm game program in Pennsylvania, by James N. Morton, pp. 56-62. Long-standing and acuteness of trespass difficulties. Efforts to solve them in Pennsylvania by a system of farm game refuges with surrounding public shooting grounds and by controlled shooting areas on farms, in both cases without direct compensation to farmers. Both of the plans promise to be successful.

Wildlife in relation to forest management, by Samuel N. Spring, pp. 65-69. Need of taking into consideration such basic factors as the soil and its organisms, and the insect population and its effects upon the forest, and of research to gain definite understanding of local diversities that are sometimes quite unexpected. Correlation necessary of the different phases of forest productiveness and of public uses of forests.

Our fur-bearing animals and their proper place in any conservation program, by Harry Van Cleve, pp. 70-72. Need of additional protection for fur animals; refuges recommended; skunks more useful than injurious; improvement in methods of trapping, especially by novices, much needed.

The effectiveness of the bounty system as a predator control measure, by Richard Gerstell, pp. 74-83. Essentially the same material as abstracted under the title "The Pennsylvania system" in WILDLIFE REVIEW, No. 8, April 1937, p. 3.

Courses announced by Texas Agricultural and Mechanical College, where Dr. Walter P. Taylor has recently been made Head of the Department of Wild Game, include Wildlife Conservation and Management, General Mammalogy, Ecology of Animals and Plants, and General Ornithology, for undergraduates; and Advanced Wildlife Studies and Research on Wildlife Problems for graduates.

Virginia Wildlife, the first issue of which appeared in September, is to be published monthly by the Virginia Wildlife Federation (Blacksburg, Va., 25 cents a year). The first number contains interesting comment on the new abandoned system of bounty payments for hawks in Virginia, a wildlife program for public schools, and an article advising license fees for cats.

Among the laws enacted in Wisconsin in 1937 was one providing a penalty for setting "a steel-jawed trap or any trap which might kill or injure birds, on a pole, post, tree stump or any other elevated perch more than three feet above the ground."

The Wisconsin Conservation Department has established a nursery capable of producing millions of seedlings annually. The plants grown are species useful to wildlife and they will be distributed beginning this fall to cooperators throughout the State. The Department has already supplied more than 8 tons of seed corn and buckwheat to encourage feed patch planting.

Those who still visualize British shooting estates as paradises for hunters may profit by the following account from Time (30(8), Aug. 23, 1937, p. 34): "Since it is hard to shoot grouse without encroaching on one of the 800 private highland moors, renting them to individuals and syndicates is a big business. Rent is usually computed on the estimated yield at $5 a brace. A moor will cost from $1,000 to $35,000 for the six-week season. From that point money is spent with great rapidity by hosts and guests on dogs (which cost up to $40 apiece to rent), dozens of beaters ($2 each a day), a loader for each gun ($2.50 a day), shells, servants, tips, food. To bring down one grouse costs between $5 and $10." These things indicate a paradise for millionaires, perhaps, but not for the Americans we hear so much about who must have "free public shooting."

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WILDLIFE REVIEW

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Washington, D. C. No. 11 February, 1938

Biological Survey: Annual Report, 1936-37

Gabrielson, Ira N. Report of the Chief of the Bureau of Biological Survey, 1937 (Superintendent of Documents, Washington, D. C., 10 cents a copy), 63 pp., 6 tables, U. S. Government Printing Office, 1937.

A report presented concisely under more than 60 heads is difficult to summarize. All phases of the Bureau's work are treated and this is the only publication that does describe Biological Survey activities with so wide a scope. Those interested in the research work will find an outline of progress in all its branches. The work of cooperative research units and the investigation of wildlife management as a supplementary farm enterprise will no doubt be of special interest to readers of WILDLIFE REVIEW. In economic investigations the ecology, propagation, and control of waterfowl food plants, mosquito control operations in relation to wildlife habitat, management studies, and control of destructive species probably will have similar appeal. The operations of the Bureau in fur-animal investigations and in wildlife diseases are summarized. Corresponding to major activities of the period, the sections on acquisition of lands for refuges, the migratory-waterfowl restoration program, and administration of national wildlife refuges are prominent. Federal enforcement of wildlife conservation laws also receives attention.

Conservation: Brown pelican

Anon. The brown pelican, Texas Federation of Nature Clubs (7460 San Benito Way, Dallas, Tex.), 5 pp., cover photo, 1 graph.

Plea for protection of this species on the Texas coast where it is now persecuted, based chiefly on quoted arguments as to the worthless character of the fishes on which the birds chiefly feed. There is only one colony now on the Texas coast where there were 17 in 1918 and 500 individuals where there were then 5,000.

Conservation: Crow

Emergency Conservation Committee. Man's friend: the crow (Emergency Conservation Committee, 734 Lexington Ave., New York, N. Y.), Publication 65, 10 pp., 1 photo, Sept. 1937.

Two articles by Ellsworth D. Lumley "The crow as a 'villain'" (abstracted in WILDLIFE REVIEW, No. 7, December 1936, p. 2), and "The crow in relation to waterfowl", reprinted from Nature Magazine, together with an introductory sketch. The last makes points in favor of the crow, criticizes methods of the anti-crow campaigns, and discusses the crow's activities from the balance-of-nature point of view.

Conservation: Hawks

Pough, Richard H. Iowa hawks and their ecological niches, Iowa Bird Life (Winthrop, Iowa, 15 cents a copy), 7(4), Dec. 1937, pp. 42-43 (1 page of half-tone figures).

Brief account stressing general utility of the hawks accompanied by plate showing shape and markings of common kinds with spread wings as seen from below.

Conservation: History in Wisconsin

Scott, Walter E. Conservation history, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.), 2(9), Sept. 1937, pp. 26-31.

Continuation (1915-18) of the chronological account of the State's conservation activities. See also WILDLIFE REVIEW, No. 9, July 1937, p. 3, and No. 10, Oct. 1937, p. 3.

Conservation: Owls

Lumley, Ellsworth D. Owls. With preface by Paul L. Errington, Emergency Conservation Committee (734 Lexington Ave., New York, N. Y.) Publication 67 (Teaching Unit 5), 10 pp., illus., 1 table, Sept. 1937.

References given to 13 papers from which information was drawn. General discussion of owls, their adaptations for hunting, the study of their food, persecution of owls especially by pole traps, and "the real truth of predation." Short statements as to the food of 11 groups of owls, still briefer tabulation of distribution, size, and food of 14 species. Summary of State laws relating to owls; 3 give all species protection, 15 protect none. Suggestions for essays about owls. The preface, by Errington, sketches his change of views as to owls from boyhood through his experience in natural history investigations to date, and gives a summary of his views on predation. It is no more wrong for an owl to eat a bird than for the bird to eat an insect. In general what a predator preys upon is determined by what is most available. The owls themselves have their losses from predation and other causes and their numbers remain fairly constant from year to year. Some degree of control, especially of the great horned owl, may at times be desirable.

"The advisability of campaigning against Horned Owls in the wild depends upon circumstances--where the owls are and what they are doing, whose interests would be served by killing them, and what assurance that anything worthwhile would be achieved thereby. But whatever may be the legitimate place of predator control in the activities of a community, any control undertaken should always be conducted with moderation and discrimination and with full awareness of its shortcomings. From the standpoint of game management alone, over-emphasis of predator control may result not only in the diversion of time, effort, and funds from more productive endeavor, but it may result in the unnecessary sacrifice of species without which our out-of-doors would be sadly lacking. Our owls--the 'good' and the 'bad' alike, among other native wild creatures--belong to our woods and our prairies, and it is our duty to insist that they as a part of our heritage be administered with reasonable forethought and care."

Conservation: Peat land in relation to wildlife

Dachnowski-Stokes, A. P. Peat land for wildlife, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 26(4), July-Aug. 1937, pp. 55, 62-63, 3 photos.

Failure in obtaining agricultural land by draining peat areas are chiefly due to wrong selections. Choice should be made by scientific methods and unsuitable areas should not be drained. The great capacity of peat for storing water and its corresponding importance in maintenance of environment for wildlife are emphasized. Suggestions are made for improvement of public policy respecting peat lands. Bibliography of 7 titles, all by the author.

Control: Bird damage to cherries

Cardinell, H. A. Protecting cherries from birds, Mich. Agr. Expt. Sta. Circ. Bul. (Michigan State College, East Lansing, Mich.) 160, 22 pp., 7 figs., 4 tables, May 1937.

Review of both European and American publications referring to destruction of small fruits, especially cherries. Losses in Michigan orchards chief to robins and starlings. Notes on protective devices, of which the automatic acetylene exploder was found effective and economical; description of the exploder and of its use. Bibliography of 26 titles.

Control: Coyote

Young, Stanley P., and Harold L. Dobyns. Den hunting as a means of coyote control, U. S. Dept. Agr. Leaflet (Superintendent of Documents, Washington, D. C., 5 cents a copy) 132, 8 pp., 2 figs., Oct. 1937.

Importance of den-hunting; qualifications and equipment of the den hunter; breeding habits and number of young of the coyote; denning sites and habits; methods of den-hunting; activities of whelps; removing whelps from dens; trapping and shooting adults.

Control: The "vermin" problem

Reese, Albert M. The destruction of "vermin", Scientific Monthly (Science Press, Lancaster, Pa., 50 cents a copy), 40, 1937, pp. 349-353, 1 table.

"The term "vermin" is applied to animals supposed to be harmful to the few species that the sportsman wants to kill. The word and accompanying philosophy are derived from European game keepers among whom it is said "vermin" control was carried to such an absurd length as to call for killing of nightingales because they disturbed the sleep of pheasants. The writer cites as "vermin" control in the United States, the Federal predatory animal campaign and the activities of certain State game departments. He gives a tabulation of the animals killed in "vermin" control contests in an "Eastern State" [which happens to be his own--West Virginia] and comments on the

indiscriminate slaughter of groups, as snakes, hawks, and owls, without regard to the differing merits of species. He challenges classification of chipmunks as "vermin" and might have gone farther as the list includes sparrows, turtles, and terrapins. Arguments against sweeping "vermin" control are quoted from Errington and Grinnell in the United States and Kinghorn and Thompson relative to Australia. Nineteen out of 27 State game commissioners expressed themselves in favor of "vermin" control campaigns. The article reproduces resolutions of the American Society of Mammalogists urging modification of Biological Survey predator control and a protest by the American Society of Zoologists and the Ecological Society of America against wholesale destruction of wildlife.

Cycles

Wing, Leonard W. Wildlife and cycles, American Forests (919 Seventeenth St., Washington, D. C., 35 cents a copy), 43(10), Oct. 1937, pp. 496-497, 512-513, 4 photos, 1 graph.

A popular account of cyclic phenomena especially in game species and their relation to hunting practices and regulations.

Cycles: Snowshoe hare

MacLulich, D. A. Fluctuations in the numbers of the varying hare (Lepus americanus), Univ. of Toronto Studies, Biol. Ser. (University of Toronto, Toronto, Canada, $1.25 a copy), 43, 136 pp., 18 figs., 18 tables, 1937.

Review of previous work especially of findings based on fur returns of the Hudson's Bay Company. History of fluctuations as revealed by fur returns, literature, and questionnaires; 6 maps, for as many seasons, show the records for Ontario. Given phases of the cycle occur progressively, not simultaneously, in different parts of Canada and Alaska. The abundance of the lynx is shown to be definitely correlated with that of the hare; fluctuations of neither are correlated with sunspot periodicities. No cause of the cycles is indicated. It is concluded that the relaxation oscillations of Gause describe the fluctuations of the hare, rather than the "classical" equations of Volterra. ["Describe" is the proper word, the mathematics explain nothing. Gause's work deals with entirely abnormal competition in microcosms of protozoan species that have existed together in nature without materially damaging one another through periods of time, probably only to be described in geological terms.]

The publication contains a great deal of information on life history of the hare, both compiled and derived from field work, the methods of which including trapping, censusing, and observing are described. Formula is given for converting figures for abundance of droppings into numbers of hares. The range in numbers, namely, from 0 to 5,000 per square mile, is astonishing. The number and growth of young, and the body temperature, food, habitat, territory, cruising radius, forms and burrows, and nocturnal habits of adults are life history topics treated. There is a review of epizootics caused by bacteria among animals in general, an extended account of the bacteriology of the hare, and a catalogue of the normal bacterial flora of the species as

determined by this study. Both external and internal parasites are considered one of the latter group, a blood-sucking stomach worm (Obeliscoides cuniculi), is known to have caused an epidemic in the wild. There are 10 pages of bibliography.

Destruction: By arsenical baits

Reed, Watson E. Grasshopper poison and wildlife, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 26(4), July-Aug. 1937, pp. 53, 61, 64, 3 photos, 2 tables.

Review of Whitehead's report on same subject for Oklahoma, and report on author's studies in Iowa. Devastation by grasshoppers affected not only crops but all plants and greatly reduced the plant food supply for wildlife. Tables show the percentage of the food made up by insects and by grasshoppers alone of small collections of 17 species of birds and 9 of mammals. There are field notes on food habits and reports on animals found dead. "On not a singl farm where the poison bait had been used according to directions x x x was a domestic or wild animal found poisoned." Bibliography of 4 titles.

Destruction: Effects of arsenical sprays

Frost, Allen. Effect upon wildlife of spraying for control of gipsy moths, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(1), Jan. 1938, pp. 13-16.

Description of the site of the observations and lists of birds seen on sprayed and unsprayed areas; these were in the proportion of 18 to 154. Brief notes on a few other vertebrates. New York.

Destruction: Muskrats by drowning

Errington, Paul L. Drowning as a cause of mortality in muskrats, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(4), Nov. 1937, pp. 497-500.

Flooding, prolonged intense wave action, and accidental dragging of suckling young into water by their mothers, result in drownings, sometimes in surprising number. The losses appear to occur in proportion to density of population.

Diseases and Parasites: Avian coccidiosis

Boughton, Donald C. Notes on avian coccidiosis, The Auk (3200-22nd St., North, Arlington, Va., $1.00 a copy), 54(4), Oct. 1937, pp. 500-509, Pl. 31, table.

Brief statement of life cycle of coccidia of which 2 genera, Isospora and Eimeria, occur in birds. In abundance they cause disease, coccidiosis, symptoms of which are described. Treatment is ineffective but sanitation can

prevent serious infection. Diagnosis; spores and infected tissue illustrated. A tabulation cites orders of birds from which coccidia have been reported; annotations include critical notes and the number of species recorded as affected. Orders from which coccidia have not been reported are listed. Host-specificity and other scientific problems associated with coccidia are discussed. Bibliography of 26 titles.

Diseases and Parasites: Avian malaria

Huff, Clay G. A new variety of Plasmodium relictum from the robin, Journ. Parasitology (Lime & Green Sts., Lancaster, Pa.), 23(4), Aug. 1937, pp. 400-404, 2 figs., 1 table.

A new strain of avian malaria, description, life history; infectivity for various mosquito species. Bibliography of 9 titles.

Diseases and Parasites: Blood-parasites, Nebraska birds

Coatney, G. Robert, and Robert L. Roudabush. Some blood parasites from Nebraska birds, American Midland Naturalist (University of Notre Dame, Notre Dame, Ind., 50 cents a copy), 18(6), Nov. 1937, pp. 1005-1030, 3 pls., 1 table.

Report on studies of blood parasites found in 26 out of a collection of 89 specimens of Nebraska birds. Haemaproteus, 8 species, 4 spp., and 1 var., described as new; Leucocytozoon, 4 species of which 2 vars. are d.a.n.; Trypanosoma 1 species; Microfilaria, not specifically determined. Bibliography of 41 titles.

Diseases and Parasites: Choanotaenia

Horsfall, Margery W., and Myrna F. Jones. The life history of Choanotaenia infundibulum, a cestode parasitic in chickens, Journ. Parasitology (Lime & Green Sts., Lancaster, Pa.), 23(5), Oct. 1937, pp. 435-450, 1 pl., 1 table.

Review of literature to 6 titles of which references are given. Procedure in experimental studies of transmission through alternate insect hosts; morphology; life history. This parasite is known from various wild birds, chiefly gallinaceous, of which the following occur in the wild in the United States: European partridge and ring-necked pheasant.

Diseases and Parasites: Coccidia in reptiles

Roudabush, Robert L. Some coccidia of reptiles found in North America, Journ. Parasitology (Lime & Green Sts., Lancaster, Pa.), 23(4), Aug. 1937, pp. 354-359, 5 figs.

Most examinations have given negative results, but several positive determinations are recorded for 4 forms, 2 of which are described as new species and 1 as a new variety. Bibliography of 6 titles.

Diseases and Parasites: Control in propagated game birds

McKenney, F. D. Disease control in the propagation of game birds, Modern Game Breeding (J. A. Gardy Printing Co., 23 W. State St., Doylestow, Pa., 25 cents a copy), 7(10), October 1937, pp. 4-5, 14.

Importance of choosing proper site and of avoiding overcrowding. Propagating systems in use and suggestions for sanitation adapted to each, especially the segregation and care of hens. Mechanical incubation and brooding rapidly replacing other methods make sanitation easier. Construction and care of holding pens and other inclosures. Precautions to be used in connection with feeding. The suggestions are directed toward the care of both upland and aquatic game birds.

Diseases and Parasites: Deer hosts of cattle tick

Anon. Ticky deer in Florida, Florida Cattleman (Kissimmee, Fla.), 2(2), Nov. 15, 1937, pp. 11, 14, 1 map.

Examination by the Federal Bureau of Entomology of various birds and mammals collected in an area infested by the tropical cattle tick revealed ticks only upon deer. Experiment proved that the ticks grow and reproduce upon deer almost as rapidly as on cattle. Ticky deer are limited to three well-separated and restricted areas, the location of which is shown on the map. These areas are private and State game preserves and must be cleaned up "if Florida is ever to complete the work of tick eradication."

Diseases and Parasites: Differential mortality of sexes from gapes

Whitlock, S. C. An apparent case of sexual difference in resistance to parasitic infection, Journ. Parasitology (Lime & Green Sts., Lancaster, Pa.), 23(4), Aug. 1937, p. 426.

Of 34 cases of infection of Hungarian partridges by the gapeworm (Syngamus trachea), about half of them fatal, 32 were in females.

Diseases and Parasites: Foot and mouth disease

Creaght, ------. Foot and mouth disease. The search for the carrier and the need for an antidote, The Field (Breams Bldgs., Chancery Lane, London, England, 2 shillings a copy), 170(4330), Nov. 20, 1937, pp. 1346, 1348.

Discussion of occurrence, symptoms, and importance, especially in Great Britain. Notes on possible carriers including various birds, as house sparrows and starlings, all of which have thus far proved quite unaffected by the virus and incapable of carrying it. The author says in this regard: "I think we are forced back to the earlier and proved theory that the disease is spread by the movements of undiagnosed farm animals and by human beings who have been in contact with them."

Diseases and Parasites: Mink-worm

LaRue, George R., and Donald J. Ameel. The distribution of Paragonimus, Journ. Parasitology (Lime & Green Sts., Lancaster, Pa.), 23(4), Aug. 1937, pp. 382-388.

Synopsis of world, and North American records. The life history is passed in crayfishes, snails, and mammals; the most frequent host in the last-named group appears to be the mink. Extensive bibliography.

Diseases and Parasites: Minnesota investigations

Green, R. G. et al. Minnesota Wildlife Disease Investigation (Dept. of Bacteriology, University of Minnesota, Minneapolis), July-Sept. 1937, 3 issues comprising pp. 107-140, and tables 56-77.

Cooperators in this investigation and full authorship of the reports were recorded in WILDLIFE REVIEW, No. 10, October 1937, p. 7. The pathology and parasitism of snowshoe hares receive considerable attention; in a summary (pp. 124-126) of investigations to date, the announcement is made that "It is apparent both from positive and negative data that the primary cause of the periodic decimation of the snowshoe hare population in Minnesota is shock disease." Recognition of the disease by symptoms, lesions, and chemical findings is discussed on pages 134-136. There are the usual pathological reports on miscellaneous specimens.

Autopsies on quail from a game farm revealed wounds resulting from pecking, dietary deficiencies, ulcerative enteritis as the leading causes of death. Beaver were proved to be mortally susceptible to experimental infection with tularemia. Notes by Drs. Green and Ralph Dowdell report progress in the development of non-toxic alloy for shot to be used in wild fowling; in the alloys thus far tested, apparently a magnesium content of more than 1 percent is necessary for shot that can be disintegrated and eliminated in 24 hours by the digestive process in mallard ducks. There is an account (pp. 128-132) of botulism among waterfowl (of 11 species) in western Minnesota, with notes on parasites revealed by dissections.

Diseases and Parasites: Myiasis

Knipling, E. F., and H. T. Rainwater. Species and incidence of dipterous larvae concerned in wound myiasis, Journ. Parasitology (Lime & Green Sts., Lancaster, Pa.), 23(5), Oct. 1937, pp. 451-455.

The true screw-worm (Cochliomyia americana) was involved in about 90 percent of the total number of cases of myiasis investigated in southeastern States; larvae of 7 other genera were found as secondary species. Some of the hosts were wild species (opossum, gopher tortoise) but the great majority were domesticated animals.

Diseases and Parasites: Nematode in cormorant

Thomas, Lyell J. On the life cycle of Contracaecum spiculigerum (Rud.), Journ. Parasitology (Lime & Green Sts., Lancaster, Pa.), 23(4), Aug. 1937, pp. 429-431.

Natural and experimental infestations of fishes with this nematode with which cormorants become infected by eating the worms encysted in fishes.

Diseases and Parasites: Schistosomids

McLeod, J. A. Two new schistosomid trematodes from water-birds, Journ. Parasitology (Lime & Green Sts., Lancaster, Pa.), 23(5), Oct. 1937, pp. 456-466, 2 pls., 1 table.

Of 91 specimens representing 17 species of Canadian water-birds, 21 of two species, the herring gull and the blue-winged teal, were found infested with schistosomid blood parasites which are described and figured as new species: Pseudobilharziella querquedulae and Ornithobilharzia lari.

Diseases and Parasites: Ticks of Oregon

Chamberlin, W. J. The ticks of Oregon, Agr. Expt. Sta. Bul. (Oregon State College, Corvallis) 349, 34 pp., 11 figs., 1 table, June 1937.

General account of ticks; their economic importance; and role as disease carriers especially of Rocky Mountain spotted fever and tularemia (4 others mentioned in a table). List and systematic account of ticks occurring in Oregon; life cycle of a tick; list of the known hosts, mostly wildlife species, of Oregon ticks. Bibliography of 45 titles on ticks in general and of 34 on the spotted-fever tick and tick-fever.

Ecology: Causes of game scarcity

Bump, Gardiner. Game scarcity--some causes and cures, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 26(4), July-Aug. 1937, pp. 51-52, 58-60, 1 photo, 1 chart, 1 graph, 6 tables.

Notes on causes of scarcity. The types, cyclic, regional, and local, are analyzed in the chart and discussed in the text as to character, suggested causes, and possible alleviating practices. Application of the reasoning advanced to the general decrease in 1935-36 of pheasants in New York and New England reveals that there are too many unknowns to warrant the drawing of conclusions as to cause.

Ecology: Census methods

Anon. Methods in wildlife censuses, Journ.Amer. Statistical Assoc. (450 Ahnaip St., Menasha, Wis., $1.50 a copy), 32, Sept. 1937, pp. 537-542.

This paper, prepared in the Division of Wildlife Research, U. S. Biological Survey, comments chiefly on census methods that have been employed by that organization. They relate to beavers and other fur animals, kangaroo rats and other small mammals, jack rabbits, big game, colony-nesting birds, small birds, and waterfowl.

Ecology: Drainage control

Vogt, Wm. Thirst on the land, National Assoc. Audubon Societies Circ. (1775 Broadway, New York, N. Y.) 32, 32 pp., illus., 1937.

The subtitle, "A plea for water conservation for the benefit of man and wild life," indicates the message of the paper which cites the value of "living" swamps and marshes and the undesirable results of draining them. Drainage control is held to be a necessity and suggestions are made as to how it may be achieved. The paper is illustrated by 4 cartoons by J. N. Darling, and includes a bibliography of 48 titles.

Ecology: Mapping vegetation

Dalke, Paul D. The cover map in wildlife management, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(3-4), Oct. 1937, pp. 100-105, 3 pls.

Use of aerial map as a base, outlining landmarks, preparation of grid of orientation lines; suggestion of symbols for cover mapping; all stages illustrated.

Ecology: Overpopulation, deer in Minnesota

Manweiler, J. Minnesota's deer problem, Minnesota Conservationist (Dept. of Conservation, St. Paul, Minn., 15 cents a copy), 50, Oct. 1937, pp. 7, 20-23, 31, 1 photo.

Description of deer habitat on large areas in northern Minnesota under management by the Farm Security Administration. After lumbering operations, deer increased greatly in numbers and finally greatly depleted their winter food. In a single winter 52 animals were found dead or dying in the yards, and during one hunting season hunters reported finding 138 dead deer. The author concludes from the data available that there is: "(1) An overstocked deer population, as indicated by deer drives, observations, and the extremely high kill ratio, (2) that the stock is of the older age class, (3) that males are excessive (this conclusion is not drawn from kill data alone), (4) that summer environment is ideal, (5) that winter food and climatic conditions are the chief limiting factors, (6) that a high percentage of winter kill is of the fawn and one and one-half year age class, (7) that the stock is vigorous, and (8) that predation is negligible where sufficient food is available. There is need for more flexible game laws permitting regulated open seasons at such times and places as will reduce the deer population to the carrying capacity of the range."

Ecology: Photoperiodism

Bissonnette, T. H. Photoperiodicity in birds, The Wilson Bulletin (Sioux City, Iowa, 60 cents a copy), 49(4), Dec. 1937, pp. 241-270.

Summarizing the results of papers cited in a closely-set six-page bibliography, this is another of Professor Bissonnette's papers that is so condensed it is practically an abstract. Daily rhythms are cited for temperature and general activity of birds, mitosis of their sex-cells, and for phases of their blood parasites. Seasonal rhythms are described as affecting temperatures, basal metabolism, thyroid activity, as well as numbers, migrations, plumage, and sexual activity. The sections, of about equal length, devoted to the last two topics compose the bulk of the paper.

Ecology: Population trends, fur animal

Atwood, Earl L., Jr. Results of the Clark National Forest fur-bearer survey, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(1), Jan. 1938, pp. 20-26, 2 graphs, 5 tables.

Conclusions drawn from a special inquiry among trappers in this forest taken in conjunction with the results of Bennitt and Nagel (Univ. Mo. Studies, 12(2), 1937. See WILDLIFE REVIEW, No. 9, July 1937, p. 12). A table shows the number and percentage of pelts taken and prices received for 10 species in 1936-37. Record of the wolves caught by a single trapper 1918-37 indicates an increase in recent years. The main object of the paper is to show population trends. From the author's summary we learn that, "(1) All fur bearers in the Clark National Forest, with the exception of wolf and gray fox, have shown a sharp decrease in numbers from 1932 to 1937; (2) the decrease in muskrat, mink, and raccoon during this period has been so rapid that all indications point to their being extirpated within a very few years if present decimating factors continue; (3) the decrease in skunk and opossum during the 1932-37 period has been much more rapid than during the 1924-32 period, indicating that these fur bearers have been reduced to the point where the numbers will decrease at an increasing rate which may result in five years, in their being in the present plight of the mink and muskrat, if present trends continue; (4) the red fox and wildcat have shown a slight decrease in numbers during 1932-36, though they can still be classed as common; (5) wolves and gray foxes have shown a slight increase since 1932. Available information indicates there are more of these animals than at any time during the past twenty years; (6) at present, the opossum is the most important in point of total numbers trapped and in total value of the pelts."

Ecology: Populations, big game on national forests

Anon. Estimate of big game animals on national forests, U. S. Forest Service (Washington, D.C.), 6 sheets, multigraphed, 1937.

The 1936 edition of a census that was begun in 1924. The big game population reported, totalling 1,684,133 animals, represents a net increase of some

140 percent in that period. Figures are given for the national forests by Regions and are summarized also by Regions and by States. The groups tabulated are antelope, bear, deer, elk, moose, mountain goat, and mountain sheep. A mimeographed covering letter of 3 pages, dated August 12, 1937, gives some supplementary information.

Ecology: Populations, brant in California

[Moffitt, James] Black brant population smaller, census reveals, California Conservationist (State Dept. of Natural Resources, Sacramento, Calif., 15 cents a copy), 2(11), Nov. 1937, p. 6.

Figures for 7 localities, during the period 1932-37, show totals varying from 13,819 to 135,153, the lowest in 1933, the highest in 1935; the 1937 count was 32,187.

Ecology: Populations, fur animals on national forests

Anon. Estimate of fur-bearing animals on national forests, U. S. Forest Service (Washington, D. C.), 1 sheet, multigraphed, 1937.

These estimates for the years 1935 and 1936 cover badger, beaver, fox, marten, mink, muskrat, otter, raccoon, skunk, weasel, and miscellaneous, and are totalled by species and by States. The grand totals for all groups, excluding miscellaneous, are for 1935, 1,440,109, and for 1936, 1,553,796. "Miscellaneous" were not tabulated for 1935 but for 1936 total 81,275.

Ecology: Populations, Ohio birds

Chapman, Floyd B. A quantitative study of the breeding birds of Nile Township, Scioto County, Ohio, Ohio Wildlife Research Station Release (Ohio State University, Columbus, Ohio) 40, 13 pp., 1 table, mimeographed, Oct. 1937.

Description of the area and of methods employed in the study; annotated list of breeding birds; list of these birds in order of abundance, 1936 and 1937; reprint of a paper by Chapman and Lawrence E. Hicks on a related subject from Bird-Lore (39, 1937, p. 379). The most significant point for wildlife technicians, perhaps, is that for population density--2.68 pairs of birds to the acre.

Ecology: Salt marshes of Louisiana

Penfound, Wm. T., and Edward S. Hathaway. Plant communities in the marshlands of southeastern Louisiana, Ecological Monographs (Duke University Press, Durham, N. C., $1.50 a copy), 8(1), Jan. 1938, pp. 1-56, 17 figs., 12 tables.

An ecological contribution of the first class. Related previous literature is reviewed and cited in a bibliography of 24 titles. Climate and physiographic conditions and the methods of the investigation are described. The vegetation of transects of representative areas is listed in tables giving in percentage the salinity of the soil water where the plants were collected. Of most value to wildlife managers, perhaps, is the full discussion of salinity as a factor in plant distribution. Most species have a wide range of salt tolerance, the range being least for those of lowest tolerance. In the probable order of salt tolerance the major marsh dominants are saw-grass, giant bulrush, broad-leaved cattail, narrow-leaved cattail, couch grass (Spartina patens), black rush, salt cane (Spartina alterniflora), and salt grass. Among biotic factors, man and muskrats are important; their roles are described. Further drainage of the marshes is considered undesirable.

Economics: Utility of native rabbit skins

Kellogg, Chas. E. Utility of jack rabbit and cottontail skins, U.S. Dept. Agr. Misc. Publ. (Superintendent of Documents, Washington, D.C., 5 cents a copy) 289, 7 pp., 4 tables, Nov. 1937.

Author's summary: This "study has revealed the possibilities of greater utilization of western wild-rabbit skins by hat manufacturers. As jack rabbits of the Midwest and the far West are likely to be considered a pest, any returns from the sale of skins will offset part at least of the expense of control. The price received will be the primary incentive for collecting the skins. This, however, will be largely determined by competing prices of the Australian rabbitskins and of those of the hutch-raised rabbits produced primarily for meat in this and other countries.

"At present the only outlet for wild-rabbit skins collected in the United States seems to be through the hatters' trade. They are not at all suitable for furriers' purposes. On the other hand, the better grade of skins from hutch-raised rabbits find their way into the fur trade because of their superior quality and the higher prices they command there."

Economics: Value of beaver dams

Scheffer, Paul M. The beaver as an upstream engineer, Soil Conservation (Superintendent of Documents, Washington, D. C., 10 cents a copy), Jan. 1938, pp. 178-181, 8 photos, 1 table.

Beaver meadows of value in relation to agronomy and forestry. Successful use of transplanted beavers in control of flood and water losses in certain valleys in Washington. The cost of beaver dams and of water storage by them is very low contrasted to that of engineering procedure.

Education: Ornithology

Baerg, W. J. Elementary ornithology (Published and copyright by the author, University of Arkansas, Fayetteville, Ark.), 70 pp., mimeographed, 1937.

Prepared for his classes, this introduction to ornithology by Professor Baerg may well have wider usage. The historical sketch mainly concerns persons who have contributed significantly either to world, American, or Arkansas ornithology. There is a brief account of fossil, recently extinct, and rare birds, and a synopsis of the relationships between birds and reptiles. The general distribution, classification, and economic value of birds are subjects of further sections of the work, and anatomy, colors and their uses, plumage and moulting, senses, song and other music, breeding habits, flight, and migration are considered. Birds and their haunts, including inter-relationships such as those brought about by cowbirds, English sparrows, and starlings; bird-banding, game birds, study topics, and questions for review also are treated. Many of the sections include references to literature for supplementary study.

Food Habits: Barred owl

Errington, Paul L., and Malcolm McDonald. Conclusions as to the food habits of the barred owl in Iowa, Iowa Bird Life (Winthrop, Iowa, 15 cents a copy), 7(4), Dec. 1937, pp. 47-49.

Study of the food from pellets is complicated by mixture of those of the great horned owl. Eliminating as nearly all of the latter as possible, the authors report on 305 pellets illustrative of the food of Iowa barred owls chiefly in fall, winter, and spring. The diet by seasons is described; preferences seem of little, availability of prey, of much, importance. The study of the barred owl adds to the evidence that a vast amount of predation is of neutral significance as concerns determination of population levels of prey.

Food Habits: Birds and lizards vs. beet leafhopper

Knowlton, George F. Biological control of the beet leafhopper in Utah, Utah Acad. Sci. Arts and Letters (Vasco M. Tanner, Brigham Young University, Provo, Utah), 14, 1937, pp. 111-140, 7 figs., 9 tables.

The beet leafhopper (Eutettix tenella) is a major agricultural pest in Utah. In this discussion of its biological control, lizards and birds are prominently mentioned. Comprehensive information is given on the food of Uta s. stansburiana; beet leafhoppers occurred in 2,249 out 4,021 stomachs. It is calculated that in one thoroughly studied area these lizards were annually consuming the leafhoppers to the extent of 264,364 per acre. Seven other species of lizards though known to feed on beet leafhoppers are of less importance. Twenty-two species of birds were found to feed on this destructive insect, their most effective work being done during fall migration. Bibliography of 31 titles.

Food Habits: Birds, Utah

Knowlton, George F. Utah birds in control of certain insect pests, Utah Acad. Sci. Arts and Letters (Vasco M. Tanner, Brigham Young University, Provo, Utah), 14, 1937, pp. 159-166, 1 pl.

Enumeration of food items found in the stomachs of 51 native, 2 introduced, and 2 domesticated species of birds, with special note and illustration relating to destruction of grasshoppers by California gulls. From author's summary, "Birds consume large quantities of injurious insects every season in Utah, compensating many times over for the moderate injury caused by a few of the species. The eating of large quantities of beet leafhoppers, false chinch bugs, ants, injurious species of pentatomids, alfalfa weevils and leaf bugs, as well as the consuming of injurious rodents, is decidedly helpful to the farmers and substantially reduces injury upon large areas of range grazing land in Utah."

Food Habits: Black bear depredations

Grimmer, W. F. The 1937 bear season, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.) 11(10), Oct. 1937, pp. 4-6.

"For some unknown reason the black bear of northern Wisconsin appears to be on a rampage." Instances are given of destruction of a heifer, sheep, hogs, bees, corn, apples and apple trees, and other property. It was necessary for the Conservation Department to give 25 special permits to kill bears and to declare an open season in 19 counties.

Food Habits: Browsing by cottontail and deer

Ostrom, C. E. Where do deer and rabbits feed?, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(8), Nov. 1907, pp. 15, 30.

Studies on the Allegheny National Forest showed that both deer and rabbits browsed scarcely any under mature forest growth although a good understory is present. The degree (in percentage) to which these animals browsed shrubs and small trees on different sites is shown in the following table.

	Old growth	Second growth (north slope)	Second growth (plateau)	Open
Deer	0.1	47	26	20
Rabbits	1.0	6	15	23

Preferences among small trees of a few species are indicated by the subjoined percentages of browsing.

	Hemlock	Red maple	Black cherry	Sugar maple	Beech
Deer	29	29	26	20	13
Rabbits	3	47	9	21	23

Food Habits: Cooper's hawk

Vaughn, Ernest A. Wildlife's public enemy No. 1, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md., 25 cents a copy), 14(4), Fall 1937, pp. 19-20, 1 photo.

List of food brought to their confined young by a pair of Cooper's hawks in Worcester County, Md.: Young chickens 10, yellow-throated warblers 2, robin 1, young bluebird 1, catbirds 2, blackbird 1, song sparrows 2, towhee 1, cardinals 2; ground squirrels 2, gray squirrel 1, flying squirrel 1, unidentified rodent 1, young rabbits 9, kitten 1. No evidence of bobwhite was found. The author refers to hundreds of similar tragedies, but that does not seem to be the correct word for a phase of the natural working out of population problems.

Food Habits: Deer browse, Adirondack

Pearce, John. The effect of deer browsing on certain western Adirondack forest types, Roosevelt Wild Life Bul. (College of Forestry, Syracuse, N. Y.), 7(1), Oct. 1937, 61 pp., 25 figs., 6 tables, 1 map.

Browsing is intensified in fall as herbaceous plants wither and in periods of deep snow is restricted to areas, termed "yards", the temporary ranges of deer herds. Deer manifest a strong desire to remain on a definite range even when others easily accessible apparently have better feed. This leads to overbrowsing, particularly in yards. Ordinary browsing is, however, light and widely distributed. Local preferences among kinds of browse and possible reasons for them are discussed but the deer were found to feed on practically every woody plant except spruce. Methods of tallying vegetation and the evidences of browsing, and of distinguishing deer and rabbit browsing are described. Red maple, yellow birch, mountain holly, and witch hobble have special appeal to deer in the region; and the appearance of the last-named is the best indication of the general degree of browsing in old growth. The report is written from the forestry point of view but there is much in it, especially as to preferred browse and degree of utilization, that is of value to the wildlife manager. Bibliography of 74 titles.

Food Habits: Montana birds

Mills, Harlow B. Some Montana birds, their relationship to insects and rodents, Montana Agr. Expt. Sta. Circ. (Bozeman), 151, 48 pp., 20 figs., Sept. 1937.

A chiefly compiled account dealing mostly with the economic relations of raptorial and fish-eating birds; swans, cranes, magpie, and crow also are discussed. Bibliography of 30 titles.

Food Habits: Skunk

Allen, Durward L. The skunk: a boon or pest?, Michigan Conservation (Dept. of Conservation, Lansing, Mich.), 7(4), Dec. 1937, pp. 3, 9-10, 1 photo.

Good introductory statement on predation from which one sentence is: "A fox eating a rabbit is no more vicious than a cow munching away in a clover field." A study on an area where several thousand chickens were reared, and

skunks were abundant, revealed that the animals got mainly dead or diseased birds--a conceivably useful activity. Killing of healthy chickens by skunks is regarded as exceptional. The sound policy is to manage the chickens so that skunks cannot get them rather than to combat the skunks. Hive bees are sometimes molested but can be protected by elevating the hives 2 feet above the ground. Skunks are destructive to the eggs of ground-nesting birds and in a heavily populated 500-acre tract were found to have eaten about 10 percent of the eggs of wild ducks. On the other hand skunks feed extensively upon insects, including white grubs, cutworms, grasshoppers, crickets, and other injurious kinds. Perhaps the greatest service that the skunk renders the farmer is in the destruction of mice and rats. Quotations are given from several authors as to the predominantly useful food habits of skunks. The author concludes that in general the skunk is highly valuable to agricultural interests. When control, other than trapping for fur, is needed, it is best accomplished by destruction of a sufficient number of females, a practicable procedure as the females were found to congregate in winter burrows.

Food Habits: Skunks

Selko, Lyle F. Food habits of Iowa skunks in the fall of 1936, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(3-4), Oct. 1937, pp. 70-76, 2 tables.

Reports on analyses by both the volumetric and frequency methods of scats of Mephitis and Spilogale. The material was not abundant enough to conceal the effect of certain adventitious factors, but it would appear safe to say that among natural foods for the period involved, striped skunks depended most heavily upon grasshoppers and spotted skunks upon meadow mice. White grubs and crickets were readily eaten by both species.

Food Habits: White-tailed deer

Davenport, L. A. Find deer have marked food preferences, Michigan Conservation (Dept. of Conservation, Lansing, Mich.), 7(4), Dec. 1937, pp. 4-6, 11, 2 photos, 1 table.

In controlled feeding experiments, white cedar proved to be the only kind of browse upon which, when fed exclusively, the deer could maintain their strength. The average consumption of this satisfactory browse was 4-1/2 lbs. per day. Less nutritious feeds and feed mixtures were consumed in larger quantities proportional to their deficiencies. The kinds of browse found fairly satisfactory in mixtures included: white cedar, white spruce, balsam fir, jack pine, hard maple, soft maple, poplar, basswood, scrub oak, black ash, yellow birch, and American elm. Timothy and cracked corn also proved to be a sustaining diet but there was great wastage of the hay, and the grain had to be fed with care to prevent overeating. Soy-bean meal, dried skim milk, and codliver oil were accepted as supplementary diet, but a number of other things were rejected, including a special mineral mixture. Browse-plot studies led to the conclusion that the carrying capacity of good cedar deer yards should be from 3 to 4 animals to the acre. A table (with 10 headings) of chemical analyses of 15 sorts of browse is presented. The protein content was highest

in alder (9.79) and lowest in scrub oak (5.20), all below what is considered a desirable proportion (12 percent) for domestic livestock. Seasonal variations in diet are marked and coincide in the main with changes in availability. The studies are being continued.

Life Histories: Baird's sparrow

Cartwright, B. W., T. M. Shortt, and R. D. Harris. Baird's sparrow, Royal Canadian Inst. Trans. (Ontario Museum of Zoology, Toronto, Canada), 21(2), 1937, pp. 153-197, Pl. 16, 1 fig., 7 tables.

History of knowledge of the species, Ammodramus bairdii; account of its range and migrations; field identification marks; courtship and mating; habitat and territory; nests and nesting; plumages; food and feeding of young; voice; and parasitism by cowbirds. There is a list of specimens in museums, another of actual breeding records, and a copious bibliography.

Life Histories: Bobwhite

Bogle, M. E. Bobwhite history (Author, 105 Routt St., San Antonio, Texas, $1.00 a copy), 47 pp., illus., 1938.

Although a commercial publication, a high proportion of its pages is devoted to life history topics, the more interesting and valuable because they are not wholly compiled but incorporate knowledge gained by the author in his extended experience as hunter and dealer. The varieties of bobwhite are described, and their ranges and weights plotted on an original map. General habits, food, and range requirements are discussed; the author gives evidence from personal experience that under the most favorable conditions a population as high as 7 birds per acre may be maintained. Surface water is not necessary for bobwhites but their dew consumption and other water requirements restrict them to fairly humid regions. Breeding phenomena, limitations on increase, life expectancy, and sex ratio are fairly discussed. The account of the farmer-sportsman relationship and the possibility of cash returns for shooting rights also is unexceptionable. The history of importation of Mexican quail, methods of shipment, and related topics are treated by one who certainly knows what it is all about. As to the value of such stocking, opinions differ and the viewpoint of the author is, of course, that of the dealer.

Life Histories: Canada goose

Williams, Cecil S., and William H. Marshall. Goose nesting studies on Bear River Migratory Waterfowl Refuge, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(3-4), pp. 77-86, 4 figs., 3 pls., 1 table, Oct. 1937.

Description of the habitat accompanied by a graph showing percentages of cover provided by 5 groups of plants. Nesting period and habits, proximity of observer to nests before sitting birds flushed. Ecological factors affecting nesting of which a firm foundation often provided by muskrat structures seems of most importance. Egg production and hatch (81 percent average); egg losses and their causes. Management suggestions.

Life Histories: Canada goose gosling survival

Williams, Cecil S., and William H. Marshall. Survival of Canada goose goslings, Bear River Refuge, Utah, 1937, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D.C., 75 cents a copy), 2(1), Jan. 1938, pp. 17-19, 1 table.

Counts of 2,599 broods showed an average size of 4.87 in May and 4.73 in June, mortality in this stage, therefore, being negligible. Notes on habits.

Life Histories: Fur animals, Mississipi

Yeager, Lee E. Some habits of southern fur-bearers as indicated by trapping, American Midland Naturalist (University of Notre Dame, Notre Dame Ind., 50 cents a copy), 18(6), Nov. 1937, pp. 1072-1078, 6 tables.

Further results of the study reported on in the Journal of Wildlife Management, 1(1-2), July 1937, pp. 28-36, which was abstracted in WILDLIFE REVIEW, No. 9, July 1937, p. 27. The catch in 5 years of trapping on a Mississippi farm is analyzed as to sex, site where trapped (land or water), whether with baited or unbaited traps, attraction by different kinds of bait, the prevalence of log-walking, and the proportion drowned in water sets.

Life Histories: Microtus, growth and longevity

Hamilton, W. J., Jr. Growth and life span of the field mouse, Amer. Nat. (Science Press, Lancaster, Pa., $1.00 a copy), 71(736), Sept.-Oct. 1937, pp. 500-507, 4 figs. (graphs).

Weight (over 25 grams) a good index of sexual maturity; birth weights; growth rate; distribution of weights of trapped specimens by months; length of life, a year, more or less; activity and longevity compared to those of Peromyscus and Rattus. Three factors which apear to operate in causing a short life span in the field mouse are (a) attainment of sexual maturity at an uncommonly early age, (b) extreme prolificness, and (c) little cessation of activity.

Life Histories: Porcupine

Dale, Bonnycastle, Jr. Porky lore, Rod and Gun in Canada (1124 St. Catherine St., Montreal, Canada, 10 cents a copy), 39(6), Nov. 1937, pp. 15-16, 53-54, 3 photos.

After fights the animals pull out with their paws quills received from adversaries; description of their fighting. Notes on food; inner bark of pine, spruce, hemlock, larch, oak, beech, birch, and others. Upon opportunity they destroy fruit trees and gnaw salty objects as axe handles, pickle barrels, and harness. Control necessary about backwoods settlements but not in the forest. Bounty payments invite fraud. Notes on mating, number and care of young, and their rapid growth.

Life Histories: Sex ratio of muskrat

Marshall, William H. Muskrat sex ratios in Utah, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(4), Nov. 1937, pp. 518-159.

From author's summary: "1. Intensive trapping in the fall resulted in a sex-ratio of 48 males to 52 females in a sample of 1,065 muskrats. Intensive trapping in the spring in the same areas, resulted in a sex-ratio of 60.5 males to 39.5 females in a sample of 491 muskrats."

Life Histories: Sharp-tailed grouse

Marshall, William H., and Max S. Jensen. Winter and spring studies of the sharp-tailed grouse in Utah, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(3-4), Oct. 1937, pp. 87-99, 4 figs., 1 pl., 3 tables.

Present range and numbers; vegetation of areas supporting the grouse and its relation to their activities; effects of other environmental factors; habits of the birds; food preferences; relation to other animals and to man.

Life Histories: Song sparrow

Nice, Margaret M. Studies in the life history of the song sparrow, I, Linn. Soc. N. Y. Trans. (Linnaean Society of New York, c/o American Museum of Natural History, New York, N. Y., $1.50 a copy), 4, 247 pp., 3 pls., 18 charts, 33 tables, April 1937.

Many compliments have been paid this work but among them has not been seen the very obvious one that it shows what can be done by a single worker, at home, without elaborate equipment, and at small expense. No wealthy "angel", no outburst of publicity, and no great expedition were required but the product is a model contribution to basic research on animal populations. The report is a partial one on 8 years' work at Columbus, Ohio, on one of the most common birds. The study was very detailed but the report is thoroughly organized and each chapter of it is summarized so that a very good idea of its contents may be had merely by scanning the summaries. From these are gleaned various remarks that illustrate the significance of the work to applied ecology. Fifteen external parasites, 7 avian and 8 mammalian predators are enumerated; "the cat and Norway rat are considered the worst enemies of song sparrows." In this migratory species, the sex ratio varies, the preponderance of males being highest during the winter. Migration is dependent on both increasing day-length and rising temperature. Temperature, precipitation, availability of food, state of nesting grounds--all are shown to influence the start of nesting. The average percentage of hatch for all eggs observed during 6 years was 60, and of fledglings from all eggs, 36. Percentages of the eggs lost according to causes were: flood 2.9, predators 36.4, cowbird 6, infertility 5.7, desertion 2.4, man's activities 3.7, and death of parents 4. A substantial proportion of the young return to the place of birth. About 12 percent of the young hatched survive to breed. The holding of territory is a fundamental trait.

Some of the conclusions bearing on more theoretical matters also may well be cited. "Females do not appear to prefer the larger, handsomer, stronger males, nor do they choose the best equipped territories." "Evidence for the inheritance of color, shape, and size of eggs is negative." A review of the subject for birds reveals that, "Inbreeding in the wild apparently has been proved in only three instances." "It is believed that this Song Sparrow population illustrates Errington's principle that a well-situated population is almost immune to predation, but that an exposed one suffers heavy losses, so that survival is 'largely determined by the carrying capacity of the land.' The self-limiting tendency of animal populations emphasized by McAtee is recognized, especially in the territorial behavior of the birds. The song sparrow does not allow itself to be crowded. The author justly remarks that theorizing has outrun its factual basis but points out that for this very reason efforts should be redoubled to accumulate the needed facts. Perhaps when we have them, conclusions will be evident, theories unnecessary. The work is a mine of information and had we something like it for all of the common species, we would be fortunate indeed.

Management: Allegany State Park, N. Y.

Gordon, R. B. The relation of vegetational surveys to a State Park management policy, New York State Museum Handbook (State Museum, Albany, N. Y., $1.00 a copy) 17, pp. 329-332, figs. 193-216, 1937.

This section of a 400-page handbook presents the views of the man who, more than any other, had to do with surveying the area and compiling the report upon it. The theme of the chapter abstracted is "that any management policy based on technical and scientific information should prove more substantial than one which may be based mainly on general opinions, guesses, or traditional procedures" (p. 332). The application of the results of the vegetational survey to various features of park management is suggested. The recommendations affecting wildlife relate mainly to the setting aside of natural history preserves, game sanctuaries, and game development areas where hunting and fishing should be permitted. There is a sectional bibliography of 27 titles.

Management: Allegany State Park, N. Y.

Saunders, Aretas A. Suggestions concerning policies for the Allegany State Park, New York State Museum Handbook (State Museum, Albany, N. Y., $1.00 a copy), 17, pp. 383-398, 1937.

The purposes of the park are recreational, educational, scientific, and economic, those of the last category, however, being subordinate. The value of wildlife in the furtherance of these objects and how to preserve it for the use are the main contributions of this chapter.

Management: Burning

Conklin, W. Gard. Are game habitats improved by burning?, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(10), Jan. 1938, p. 30.

Comparison of the kill on a regularly burned forest acreage with that on another of like extent, but with fewer fires, is heavily in favor of the latter and the conclusion is drawn that the burned over region is lacking in quantity and quality of food and cover. Comment: It must not be forgotten that the effects of burning may differ from region to region, and that determining what they are is not to be done in an offhand manner. The researches of S. W. Greene in Mississippi, referred to in previous issues of WILDLIFE REVIEW (No. 1, September 1935, p. 12; No. 4, June 1936, p. 13), show that the relations of fire to environment are very complicated and anything but easy to appraise.

Management: Dispersing deer concentrations

Cox, W. T. Preventing deer concentrations, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(1), January 1938, pp. 1-2.

Planting to assure better interspersion of cover and food supplies; driving or luring deer from overstocked yards.

Management: Farm-game in Carolina piedmont

Stevens, Ross O. Wildlife conservation through erosion control in the piedmont, U. S. Dept. Agr. Farmers' Bul. (Supt. of Documents, Washington, D. C., 5 cents a copy) 1788, 25 pp., 20 figs., tables, 1937.

Though numerous devices are employed to control erosion, a complete job is done only by the use of plant cover. Many plants of value for erosion control supply food and cover for wildlife. Hence erosion control and wildlife conservation go well together. This welcome bulletin tells what has been done jointly to further these interests on farms in the Carolina piedmont, and gives them graphic significance by well selected illustrations. General headings in the publication are: conservation on cultivated fields, dedicating eroded areas to wildlife, the wildlife crop, shrubs for erosion control and wildlife use, seed-producing annuals and perennials, and sportsmanship on farms. The section devoted to erosion control practices treats gullies and gall-spots, terrace outlets and waterways, field borders, retired lands, and pastures. The lists of shrubs and of annual plants for use on various sites should be very helpful. All in all this is the most practical publication on wildlife management the Government has issued.

Management: Farmer-sportsman relationship

Chalk, John D., and Ross O. Stevens. Cooperative farm game program (Dept. of Conservation and Development, Raleigh, N. C.), 8 pp., 1937.

Plans for 5-year sanctuaries, temporary sanctuaries, and regulated hunting, by which it is hoped to: "(1) Conserve and promote the interests of wildlife and related resources in general with due regard to all values and all groups of people; (2) increase the supply of game birds and other game animals and thereby in the long run increase the amount of hunting which will be possible; (3) increase the amount of satisfactory hunting range; and (4) bring about more orderly hunting to the mutual benefit of land owners, sportsmen, and nature lovers."

Management: Farmer-sportsman relationship

Conklin, W. Gard. A review of the farm-game refuge program, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(10), Jan. 1938, pp. 14-17, 31, 7 photos (one an aerial map).

Record of accomplishments in number of projects, legal agreements, refuges, and safety zones; in a little more than a year the movement was extended to some 40,000 acres in 17 counties. More than a hundred each of both farmers and sportsmen were interviewed in order to get information on the working of the plan and suggestions for improvement. What the farmers seemed to want most was protection. It is considered that the arrangement has worked satisfactorily on the whole, and that it probably will be extended.

Management: Forest management in relation to wildlife

Curtis, James D., and R. E. Trippensee. A proposed study of timber and wildlife production in central New England, Journ. Forestry (Mills Bldg., Washington, D.C., 50 cents a copy), 35(12), Dec. 1937, pp. 1111-1115, 2 photos.

Suggestions as to interrelations of wildlife and the forest; description of area (Mt. Toby Forest, Mass.) selected for the investigation, including notes on available equipment and mention of the more common trees and animals. Part of the authors' abstract is: "Of all combinations of land-use, few fit so many conditions as timber and wildlife production. The demand for both is widespread and, interpreted in a literal sense, both are vital to perhaps a larger proportion of people than any other two forest products. That this demand in some form or another is likely to increase is inevitable and when it does the need of combined management of both resources will be justified more than ever before. Massachusetts State College, along with a considerable number of other research institutions, has undertaken a long time study of this problem.

Management: Fur seal

Bower, Ward T. Alaska fishery and fur-seal industries in 1936, U. S. Bureau of Fisheries Administrative Rep. (Superintendent of Documents, Washington, D. C., 10 cents a copy), 28, pp. 279-347, numerous tables, 1938.

Discussion of the fur-seal industry occupies pp. 326-347. Intercalated is information on artic foxes, sea-otter, and reindeer, and on pp. 322-323 is a brief statement about whaling in 1936. The seal herd has been steadily

increasing under management and in 1936 was estimated to include nearly 1,700,000 individuals. Of these 52,446 were killed and the skins of 42,239 of them were sold for a gross sum of $1,192,172. A special paper "Computation of fur seals, Pribilof Islands, 1936" by Harry J. Christoffers contains data on the make-up of the herds by sexes, age classes, and harems, and makes recommendations for changes in management and harvesting.

Management: General

LeCompte, E. Lee. Conservation plan for wildlife, Maryland Conservationist (512 Munsey Bldg., Baltimore, Md., 25 cents a copy), 14(4), Fall 1937, pp. 5-8, 6 photos.

Suggestions as to many aspects of game management including protection and maintenance of cover, control of grazing and fire, provision of water, and production of food by planting suitable trees and shrubs.

Management: Harvesting, deer kill, California

Anon. California's eleven-year deer harvest by counties, California Conservationist (State Dept. of Natural Resources, Sacramento, Calif., 15 cents a copy), 2(11), Nov. 1937, p. 5.

Tabulation; the reported kill from 1927 to 1937, inclusive, varied from 17,686 to 31,890. In a supplement entitled "Final 1937 deer kill is tabulated" (same journal, 2(12), Dec. 1937, p. 23) the 1937 figures are given as 32,211 and the average for the years 1927-36 as 21,564.

Management: Harvesting quail

Denmead, Talbott. Maryland quail records, Maryland Conservationist (512 Munsey Building, Baltimore, Md., 25 cents a copy), 14(4), Fall 1937, pp. 18-19, 1 photo, 1 table.

Number of quail taken annually from 1904-36 (5 years omitted) over a certain territory in Dorchester County, Md., by a group of 2-5 hunters. The totals vary from 16 to 146, and the average number of quail to a hunter per day from 1.77 to 11.5. The record shows also the total bags of woodcock and jacksnipe. This article is of further value as embodying the findings of Dr. Alexander Wetmore as to the results of stocking with Mexican quail. Of 92 birds examined, only one appeared to be of pure Mexican stock; it was Dr. Wetmore's opinion that the introductions had not been successful. For a number of years the released Mexican quail were banded but only one banded specimen was recovered. There are other interesting observations by the writer on conditions and incidents of the period.

Management: Herd control

Avery, Ben. Birth control on the Kaibab, Arizona Wildlife Magazine (32 W. Jefferson St., Phoenix, Ariz., 25 cents a copy), 7(7), Nov.-Dec. 1937, pp. 5, 13, 1 photo.

"Herd control on the Kaibab" would have been a better title for this article which brings welcome news of a generally little understood situation. The Kaibab deer overpopulation and its effect on the environment is an old story but many probably do not realize that the herd has been in process of reduction for 13 years. To provide more game for hunters, the numbers of mountain lions and coyotes on the area are being kept down. "Extermination of neither is proposed though it is hoped to keep them to a low number." In 1937, 1,465 deer were killed and the remaining herd estimated at about 16,000. The animals now keep in good condition and officials believe the time has come to halt the reducing process. Shortening the season in 1937 did not reduce the kill to the desired extent so other measures may be required. Statistics are given on the number of bucks killed in 1937 according to the antler-point classes. The heaviest weighed 247 pounds; the widest spread of antlers was 42 inches. Formulas are presented for determining age of deer by tooth characteristics.

Management: Herd reduction

MacKenzie, H. W. To the citizens of Wisconsin interested in deer, Wisconsin Conservationist (Wisconsin Conservation Dept., Madison, Wis.), 2(9), Sept. 1937, pp. 3-9.

Deer have been increasing and their food supply decreasing so that there has been damage to forests and to the animals' habitat. Recommendations for liberalization of the open season were accepted by 61 counties. In 1936 about 30,000 deer were killed. A brief article immediately following the preceding quotes from a letter to the effect that in recent years deer have been 10 or more times as abundant as they were 50 years ago--a result the writer, an old-time hunter, attributes, in part at least, to the killing off of wolves.

Management: Miscellaneous

Anon. Wildlife management in North Carolina (Division of Game and Inland Fisheries, Raleigh, N. C.), 16 pp., Jan. 1938.

Interesting brief accounts of a variety of topics. Two are the relation of birds to boll-weevils and to chinch bugs; quail are given credit for cleaning up an infestation in oats near Wadesboro, N. C. In a feeding experiment with captive quail, it was found that the birds took privet berries readily and did not lose weight appreciably when given nothing else for a week. Two instances are cited of increasing the squirrel population by providing shelter logs and boxes together with some winter feeding. [In one case 200 squirrels are said to be inhabiting "a few acres"; it would be of interest to learn what the effect is on the bird population.] Food patches of lespedeza and fruit-producing shrubs are freely utilized; annual crop plants, including Brabham and Iron cowpeas, Laredo soybeans, Mung beans, German and Browntop millet, and Kafir corn, also are valuable. Notes are given on the North Carolina farm game program, on the reasons for wildlife protection, and on winter feeding.

Management: Planting, black locust

Anon. Effect of depth of sowing on nursery yields of black locust, Southern Forestry Notes (Southern Forestry Expt. Sta., New Orleans, La.), 20, Jan. 1938, [p. 4].

Seeds covered 1/4 inch in silty clay and 1/4 and 1/2 inch in sandy soil, gave much higher yields than those buried deeper. "In order to insure uniform covering at such shallow depths, a careful adjustment and operation of mechanical seeders is required, as well as a thorough preparation and leveling of the seedbed prior to sowing."

Management: Planting, Nebraska

McComb, H. A. Trees, shrubs, and vines at the North Platte Experimental Substation, Agr. Expt. Sta. Bul. (Univ. of Nebraska, Lincoln) 310, 38 pp., 16 figs., 8 tables, July 1937.

Another of the very useful series of experiment station bulletins on hardiness of plants for difficult situations. This bulletin summarizes results of planting since 1907 for a locality where the average rainfall is just under 19 inches and wide variations in annual and seasonal precipitation characteristic. The temperature range is great and changes abrupt. The prevalence of high winds increases the difficulty of growing trees. Windbreaks are, therefore, given special attention but other functions of woody plants are not neglected. Hardiness, implying satisfactory resistance to all unfavorable local conditions, is fully described for all species treated. These number 27 groups of deciduous, and 20 of evergreen, trees, 30 of deciduous shrubs, and 7 of vines. There is also a complete list of plants of these categories that have been tried at the North Platte Substation with annotations as to hardiness.

Management: Planting for wildlife and erosion control

Harper, Frank B. Wide-row plantings of annuals, Soil Conservation (Superintendent of Documents, Washington, D. C., 10 cents a copy), 3(6), Dec. 1937, pp. 163-164, 3 photos.

Rows of corn, cane, Sudan grass, and sunflowers at intervals across fields cultivated for potatoes and other crops in North Dakota, to act as windbreaks, accumulate snow moisture and provide food and shelter for wildlife. Sunflowers used also parallel to tree and shrub windbreaks.

Management: Planting for wildlife, Lespedezas

Massey, A. B. Native food plants--the lespedezas, Virginia Wildlife (Blacksburg, Va.), 1(2), Oct. 1937, pp. 4-5.

Value of certain species of Lespedeza that resist snow blanketing for the supply of nutritious seeds thus kept available to wildlife through the winter. Lespedeza seeds "are high in protein, which is considered essential in conditioning birds for the breeding season."

Management: Planting for wildlife, woodland borders

Van Dersal, Wm. R. A border for the woods, Soil Conservation (Superintendent of Documents, Washington, D. C., 10 cents a copy), 3(4), Oct. 1937, pp. 99-101, 7 photos.

Shrub borders reduce undesirable effects of wind on woodlands, contribute to the natural pruning of trees, and are valuable to wildlife. Under the heads of small trees, tall shrubs, low shrubs, and vines, lists of fruit-bearing species are presented.

Management: Preserving quail breeding stock

Gerstell, Richard. Practical management of the bobwhite quail on the northern range, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(9), Dec. 1937, pp. 10-11, 28-29, 2 graphs.

A graph illustrates the effects of severe winters on the annual kill which was low following the seasons of 1917-18 and 1935-36. "Since the elimination of market hunting, major fluctuations in the quail population have been controlled, not by the kill of the hunters, nor by the effects of restocking programs, but by climatic conditions." Restocking has probably been the least effective of the Commission's quail management practices, and a banding campaign has been started to make possible more accurate appraisal of its results. In any event, winters of extreme severity cut down the quail population, however attained, and thus periodically offset the means of protection and increase that have been tried. It is suggested, therefore, that trapping large numbers of quail and holding them over winter, well-sheltered and well-fed, may be the most economical and effective means of assuring a satisfactory breeding stock. Bibliography of 6 titles.

Directions are given in an accompanying article on page 12 for trapping, holding, and liberating quail.

Management: Refuges

Anon. Game refuges on national forests--December 31, 1936, U. S. Forest Service (Washington, D. C.), 3 sheets, multigraphed, 1937.

A tabulation of State game refuges, Federal game refuges, and game areas administrative restriction, by Regions, States, and Forests. The information given is the number of refuges, their areas, the acreage grazed by livestock, numbers and classes of stock, and percentage of capacity used by livestock. There are summaries for Regions and States. The total number of State refuges is 349 covering some 21 million acres grazed by livestock to 58 percent of capacity; corresponding figures for Federal game refuges are: 31, 4 millions, and 19 percent; and for game areas by administrative restriction: 120, 4 millions, and 13 percent.

Management: Refuges, Beltrami and Pine Island areas, Minnesota

Griswold, Oliver. America's best wildlife refuge, Minnesota Conservationist (State Dept. of Conservation, St. Paul, Minn., 15 cents a copy), 51, Nov. 1937, pp. 12-13, 25, 3 photos.

Refers to the Beltrami and Pine Island projects of the Farm Security Administration together comprising one and a half million acres. About 340,000 acres have been reflooded by the building of 176 dams. Beaver and wild fowl have notably responded and forest fires have been sharply reduced in number. Elk have done well and caribou and moose will be aided as much as possible. Two hundred and fifty acres of feed patches have been seeded and 700 acres of reflooded land planted with suitable duck foods.

Management: Seed, acid treatment

Meginnis, H. G. Sulphuric acid treatment to increase germination of black locust seed, U. S. Dept. Agr. Circ. (Superintendent of Documents, Washington, D. C., 10 cents a copy) 453, 34 pp., 12 figs., 9 tables, Nov. 1937.

Mainly an account of experimental work; in field tests acid-treated seed produced from 1.7 to 14.6 times as many seedlings as did untreated seed and in extensive nursery sowings the gain was from 81 to 114 percent. The treatment costs from 2 to 5 cents a pound and is considered economical.

Management: Stocking muskrats

Storer, Tracy I. The muskrat as native and alien, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 18(4), Nov. 1937, pp. 443-460, 1 pl., 2 figs.

Natural range of the muskrat in the United States and Canada; transplantations and their results both in America and Europe. A map shows the spread of descendants of a few pairs released in Czechoslovakia in 1907. European attempts at extirpation are described; in Great Britain they promise to be successful; in central Europe they are giving way to resignation to continued presence of the animals. The history of transplants into California is given in detail including efforts at regulation. A map shows the status of muskrats in the State in 1937. There are illustrations of 3 types of traps used in Europe and a bibliography of 19 titles.

Management: Stocking pheasants

Leopold, Aldo, Orville S. Lee, and Harry G. Anderson. Wisconsin pheasant movement study, 1936-37, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(1), Jan. 1938, pp. 3-12, 1 fig.

Technique of trapping, handling, and feather-marking pheasants for this study. Details of the movement and survival of released birds. Damage to corn and steps to prevent it. Analysis of pheasant weights by localities and

sexes. From author's summary: "Wild pheasants trapped in winter from managed refuges may be cheaper and better than artificial pheasants for replenishing understocked range. x x x Where food and cover were good and coverts of ample size, there was no dispersion. Where food was good but coverts small and scattered, the released birds held well in some instances. In others they (a also the resident birds) adopted a circuit type of ranging similar to that of the large carnivores. Where food and cover were both poor, dispersion was immediate and complete. x x x In general, the Ohio plan is admirably adapted that transition period in which the farmer, while willing to help feed, is still inclined to let the state worry about winter cover. Under that plan the pheasants are wintered where cover happens to exist and then artificially redistributed so as to stock summer and fall range which would otherwise be vacant. This reduces spring congestion and crop damage. It is an artificial system but less so than the dependence on pen propagation toward which most states are steadily drifting."

Management: Winter feeding

Grange, Wallace B. Feeding wildlife in winter, U. S. Dept. Agr. Farmers' Bul. (Superintendent of Documents, Washington, D. C., 5 cents a copy) 1783, 20 pp., 9 figs., Nov. 1937.

This is a revision of Misc. Publ. 159, "Winter feeding of wildlife on northern farms," which it supersedes. The geographic scope is enlarged and mammals are given more attention than in the previous publication. The main heads are: need for winter feeding; feeding: upland game and other land birds, waterfowl, small mammals, and big game; and planning for the future. Feeding stations are described and illustrated, and feeds and methods of supplying them suggested. Interesting discussions under subheads include: organizing a winter feeding campaign, treatment of predators, natural winter foods and their shortage, range deterioration, and emergency feeding.

Management: Winter feeding

Hawkins, Arthur S. Winter feeding at Faville Grove, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(3-4), Oct. 1937, pp. 62-69, 5 tables.

Severity of winter in relation to bobwhite mortality and quantity of feed consumed at feeding stations. Methods used in measuring consumption and palatability of feeds; obstacles to measurement. Palatability ratings for 1936 and 1937 compared and preferences of species discussed. Results for rabbits agreed very well with those for game birds. The feed budget and economizing with mixtures. Tests of several natural foods. Extracts from author's summary: "Corn was greatly preferred to any other grain tested. The acceptance ranking of seven other grains in 1937 was: scratch feed, buck wheat, wheat, oats, sorghum, wheatland milo, barley. In 1936 wheat, milo, an barley ranked higher. Spiking ears on a rack has fewer faults than other methods of feeding. Consumption per animal per week is: pheasant and squirr 2 pounds; prairie chicken and rabbit, 1.5 pounds; Hungarian partridge, 1 poun quail, 0.5 pounds. Poison sumac, burdock, sticktights, dock, lamb's quarters and pigweed are taken even with corn available."

Pollution problems in California

[Shaw, Paul A., and Charles L. Towers] Water pollution--what's being done about it?, California Conservationist (State Dept. of Natural Resources, Sacramento, Calif., 15 cents a copy), 2(11), Nov. 1937, pp. 1-2, 23.

Quotation of California law relating to pollution, discussion of the chief types of pollution encountered in the State, and of what is and can be done about it.

Predation

[Williamson, F. H. H. The problem of predation], Eastern Ontario Fish and Game Protective Assoc. Bul. (Gananoque, Ontario, Canada), 2(2), Oct. 1937, pp. 5-9.

Report by the Controller of the Canadian National Parks Bureau citing the effects on game herds of freedom from predators, and damage to habitat by uncontrolled herds. "Except for direct defense of domestic stock, the attitude of the public towards predators is based generally upon prejudice and lack of knowledge, and it is the duty of those who have studied the problem, even though they have not fathomed all its intricacies, to give to the public the benefit of the knowledge gained in the hope that a saner and more philosophical view will be accepted as more is learned of the facts presented by the biologists who are wrestling with the problem."

With regard to birds of prey, the recommendation is made that, "Game administrators should do everything that is possible to meet mistaken ideas about birds of prey and to discourage the killing of them. We cannot afford to do without the services of these birds in the killing of rodents, of which they are one of the most efficient natural checks. Even if some of the larger birds do prey upon game birds, it is not proven that they do harm, and on general principles it is quite probable they do good to the species upon which they prey."

Predation: Meaning of

Errington, Paul L. What is the meaning of predation?, Smithsonian Institution Report (Washington, D. C.) 1936, pp. 243-252, 2 tables, 1937.

It is gratifying to have this summary of the findings and philosophy of one who more than anyone else in recent years has been devoting time and thought to the problem of predation. Pointing out popular misconceptions, the author shows that they are due mainly to failure to distinguish between cause and effect. He reminds us, therefore, that predation is essentially a by-product of population rather than a dominant influence on population. Most of the text is devoted to an exposition of the concept of limited carrying capacity of environment as it has been developed by the author's work with quail in the Middle West. Population above carrying capacity is vulnerable and disappears in one way or another, whether as a result of predation or of other causes of mortality. The writer asserts that his paper "is not intended

to be a brief against all attempts to control predators for x x x legitimate purposes. x x x It does submit that predator control is frequently emphasized beyond any existing justification. Too often the persecution of predators--however futile--is the one thing that is stressed in the name of conservation, whereas measures of the utmost merit are barely toyed with, if not disregarded altogether. When predator control is only blind, ruthless suppression of any and all flesh-eaters, or alleged flesh-eaters, with no heed for the status of rare or endangered species, it surely ceases to be the public interest and should be discouraged the same as any other wasteful practice.

"The interrelationships of predation are exceedingly complex and variable, and how much they will ever be understood is problematical. The accumulating evidence seems to suggest that many prey populations are constituted to withstand far more pressure from enemies than they ordinarily get; and, within the restrictions imposed by their habitats, seem to be mainly self-limiting and self-adjusting in numbers. The impacts of predation, then, are absorbed by at least some populations that seem to be resilient chiefly according to their needs. The trimming down by predation of excess populations that must disappear, anyway, is incidental. It should not be regarded as a threat to the permanent nucleus, which, barring drastic change in environment, will continue to occupy all livable quarters and produce the usual annual surplus. The surplus is strictly temporary, and generation after generation is frittered away. Whether taken by predators or otherwise lost, the surplus must disappear; population sooner or later coincides with carrying capacity."

Predators: The "vermin" question

Palmer, E. Laurence. Are they vermin?, Cornell Rural School Leaflet (Cornell University, Ithaca, N. Y.), 31(2), 32 pp., illus., Nov. 1937.

Appraisal of animals depends upon the point of view, but each observer should take into consideration the interests of others. There is a poll of 302 farmers throughout New York State showing their economic rating of various common mammals and birds, and where their information about these creatures was obtained. General discussion of birds of prey and their ecological influence. "The necessary control of harmful species and the occasionally destructive individuals of other kinds should not be given over to groups of people who are uninformed of the economics involved, who are unable to differentiate between species, or who may be influenced by propaganda." The leaflet is illustrated by numerous drawings and contains an extensive tabulation giving description, local occurrence, general range, food and life history, behavior, reactions, and relation to man's interest of 27 birds and 13 mammals including the domestic dog and cat.

Propagation: Bobwhite, feeding young

Wessell, Charles W. Raising bobwhite quail in the sportsman's pen, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(10), Jan. 1938, pp. 6-7, 12, 30, 4 photos, 1 page of diagrams.

Formula for mash used on the State game farms; instructions for feeding young birds week by week. The pen recommended and illustrated was more fully described in the preceding issue of the same journal, 8(9), Dec. 1937, pp. 6-8, 26-27, 2 photos, figs.

Propagation: Irradiation results, pheasant

Bissonnette, Thomas H., and Albert G. Csech. Hatching pheasant chicks on Christmas day, Amer. Nat. (Science Press, Lancaster, Pa., $1.00 a copy), 71(736), Sept.-Oct. 1937, pp. 525-528.

Authors' summary: "(1) One cock-pheasant and four hens, 151 days of age, were subjected to gradually increased night-lighting from October 5 to December 5; (2) breeding plumage and behavior was assumed within eight days and first egg laid by one hen on November 8; (3) eleven eggs were laid by one hen before cessation on November 28. The other four hens failed to lay, probably because of more nervous temperament and frequent disturbances; (4) of ten eggs set on November 29, three hatched at 26 days of incubation on Christmas day, one completed incubation but failed to hatch, and one developed till the egg was broken at two weeks. This is 50 per cent. fertility and 30 per cent. hatch; (5) both sexes therefore were completely activated at 185 days of age, with chicks hatched 138 days earlier than normally; (6) it is possible to get pheasant eggs at any time in autumn, winter, and spring and have chicks hatched and reared for liberation whenever desired if warm brooder houses are used."

Research: Need of

Gabrielson, Ira N. The need of research, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 26(5), Sept.-Oct. 1937, pp. 71, 78.

Laws and regulations should be made in accordance with the needs of wildlife. Research is required to show what the real needs are, and to the extent of its success depends the accomplishments of a wildlife program. Instances are given of the services of research to wildlife management. "We must know the facts--must produce the conditions needed by wildlife and then limit the human harvest to the surpluses above necessary breeding stock that can be produced. This is the only possible way, and research must supply the answers if we are to continue to have many of our finest forms of wildlife in any abundance." The Federal-State chain of cooperative research units represents the greatest development to date of the plan for basing an adequate wildlife restoration program on the true foundation of research.

Research: Nutritive value of game bird food items

Errington, Paul L. Emergency values of some winter pheasant foods, Wisconsin Acad. Sci., Arts, and Letters (H. A. Schuette, University of Wisconsin, Madison), 30, 1937, pp. 57-68.

Foods are classed as staple, inferior, and intermediate. Staples include such things as cultivated grains and soy beans, and among wild plants pigeon grass and lesser ragweed. Experiments were made with foods of the

intermediate group to determine their emergency value. They were fed singly to the limit of consumption to penned pheasants and the measure of their adequacy was the gain, or loss, in weight of the birds. The results of the author's previous tests with quail are summarized. Gain in weight was made only on a balanced ration and on a diet of shelled corn; the birds lost at varying rates (faster at lower temperatures) on 10 other foods tested, including mixture of all of them. The rate of loss of weight diminished during the course of the test with smartweed and accelerated in that with buds and catkins. Besides these browse items, the foods experimented with included sumac, poison-ivy, and coralberry fruits; greater ragweed akenes; and sweetclover, burdock, velvetleaf, dock, and smartweed seeds.

Research: Results of Federal-State cooperative units

Couch, Leo K. Research units annual report shows progress, American Wildlife (Investment Bldg., Washington, D.C., 25 cents a copy), 26(5), Sept. Oct. 1937, pp. 70, 76-77, 3 photos.

Brief reports on the activities of each of the regional widllife research units established in cooperation by the American Wildlife Institute, the Biological Survey, and the State conservation departments and land grant colleges in 9 States. In Maine, white-tailed deer tend to follow forest cutting operations feeding on the slash. It was learned in Alabama that fire-ants are not abundant enough to be an important factor in quail management at this time. In Walker County, Texas, there is an estimated population of 40,000 quail on 500,000 acres; isolated clearings are an important factor in quail abundance; the value of second-growth pine stands to wildlife decreased in a period of 5-9 years after cutting. Further results in Texas were the counting of about 350 Attwater prairie chickens on 100,000 acres of the best part of its range. [These birds have recently been given a 5-year close season by the State Legislature.] Studies on gray and fox squirrels in east Texas show: "(1) There is a winter and summer breeding season, (2) the greatest seasonal activity is in the spring and fall, (3) the gray squirrel prefers moist vegetation, the fox squirrel the drier, more open type of woods, and (4) over-harvesting of timber and over-grazing are affecting the number of squirrels." In Oregon the most serious mortality among young pheasants is due to wet weather. With respect to adult game birds, food and cover seem to be adequate and winters not unduly destructive. Hunting pressure is excessive in the more favorable feeding areas, but the birds may be protected to some extent by localizing them by the use of feed patches. On a favorable area in Utah, half of the beaver populations was harvested, the yield being at the rate of $1.03 per acre. Connecticut studies indicate that cottontail females range over 7-8 acres in the breeding season and over only .5-2 acres at other times.

Research: Tagging muskrats

Errington, Paul L., and Carolyn Storm Errington. Experimental tagging of young muskrats for purposes of study, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 1(3-4), Oct. 1937, pp. 49-61, 1 fig., 2 pls., 4 tables.

Description and illustrations of tags and method of affixing them. Information relative to tagged individuals summarized in tables includes notes on growth in length and weight; sexual advancement in varying periods; cruising radius; and mortality. Experiences with the tagging system are discussed and suggestions given for further work.

Soil Conservation Service: Annual Report, 1936-37

Bennett, H. H. Report of the Chief of the Soil Conservation Service, 1937 (Superintendent of Documents, Washington, D. C., 10 cents a copy), 51 pp., 12 tables, 1938.

The section on wildlife management (pp. 30-31) states that with proper direction soil conservation means wildlife conservation. During the fiscal year reported upon, "Wildlife-management activities of the Service were divided into three phases: (1) Direct erosion-control planting made for the benefit of wildlife; (2) development of other soil conservation practices so as to enhance their value to wildlife; and (3) development of an appreciation on the part of the farmer, other conservation agencies, and the general public of the direct relationship between wildlife welfare and soil conservation." Among achievements mentioned are the planting in demonstration areas of 3,882 acres to trees and shrubs, and of 5,318 acres to herbaceous vegetation beneficial to wildlife. Planted to trees and protected by fencing were 83,975 acres; strip cropping was completed on 462,270 acres. Ponds built, fenced, and protected for wildlife numbered 2,091, and feeding stations in regions of severe winters, 10,813. Other less readily summarized activities also are described. The immediately following part of the Report on conservation nurseries will no doubt be of interest to wildlife managers.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

BS-95. Preserves and ranges maintained for buffalo and other big game, by Clara Ruth, November 1937, 20 pp., 12 figs.

Reasons for establishment of these reservations; history and description of 10 in the United States and one in Alaska. Notes on protection of big brown bears in Alaska, on buffalo herds other than those on Biological Survey preserves, and on improvement and development of refuges. The leaflet also includes a list of publications on big-game animals.

BS-96. Blackbirds and the rice crop on the Gulf coast, by E. R. Kalmbach, November 1937, 4 pp.

Extent of damage, area affected, legal status of the birds, their habits and control.

BS-97. Abstract of fur laws, 1937-38, by Frank G. Grimes, December 1937, 31 pp.

Summaries by States and Territories; also for Canadian Provinces.

BS-98. Colleges and universities offering courses in wildlife management, 1938-38, October 1937, 8 pp.

Recent developments in education for wildlife management with list of courses and of institutions offering them; suggestions as to training needed for wildlife research and administration.

BS-99. Disease as a factor in game fluctuations, by J. E. Shillinger, December 1937, 3 pp.

Notes on cycles and their periods; results of cooperative study of causes; suggested remedial measures.

BS-100. Annotated list and index of leaflets BS-1 to BS-100, by W. L. McAtee, February 1938, 18 pp.

Nature of the series; brief abstract of each leaflet; author and subject indexes.

Copies of the above mentioned mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

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WILDLIFE REVIEW

AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
ISSUED FOR THE INFORMATION OF COOPERATORS
BY THE
BUREAU OF BIOLOGICAL SURVEY
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All of the abstracts in this issue of WILDLIFE REVIEW are of papers appearing in the

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Washington, D. C. No. 12 February, 1938

The Transactions of the Second North American Wildlife Conference, a paper-bound volume of 661 pages, published in November 1937, may be obtained from the American Wildlife Institute, Investment Building, Washington, D. C., for $1.00 a copy.

Conservation: Fur animals

Van Cleve, Harry. Our fur bearers and their conservation, pp. 539-541.

Destructiveness of out-of-season trapping; pollution inimical to the semiaquatic fur bearers; need of better laws and more refuges, and of research upon fur animal problems; usefulness of skunk; improvement in methods of trapping.

Conservation: In Mexico

Zinser, Juan. [Conservation in Mexico], pp. 6-8.

Some of the problems of game conservation in Mexico and what is being done about them, especially in the case of quail and ducks.

Conservation: National program

Gabrielson, Ira N. The work of the Biological Survey, pp. 145-156.

Achievements toward the objectives outlined the previous year (see WILDLIFE REVIEW, No. 3, April 1936, pp. 34-35, and No. 6, November 1936, p. 6) are reported. Involved are the big game and migratory waterfowl refuge programs, cooperation with State and Federal conservation agencies, action with respect to the pollution problem, research activities, and basing productive regulations on the needs of wildlife. Notable events in State conservation, and needs of the Federal program, especially in research, also are discussed.

Conservation: Taylor Grazing Act

Mclohon, A. D. Taylor Grazing Act and wildlife, pp. 159-167.

Ownership of western lands and classification according to chief use; nearly 540,000,000 acres or 72 percent is regarded as primarily suitable for grazing. Under the Taylor Grazing Act, 49 grazing districts have been set up embracing 253,000,000 acres of land. They are controlled by local boards but all appellate power has been retained in the Department of the Interior. The Act provides for cooperation with stockmen's associations, and State land and conservation officials interested in the use of grazing districts. In New Mexico the appointment is authorized of one advisor in each district to represent wildlife and recreational interests and the special rules for that State require that in estimating carrying capacity of range, allowance be made for reasonable utilization by wildlife, and further provide for the

establishment of game refuges and for control of overpopulations. Measures adopted or plans affecting wildlife in other States also are reviewed. Game ranges set up under a plan of cooperation with the Biological Survey include three established and five under consideration. In addition, the Division of Grazing has approved the alienation of lands from grazing districts and their inclusion in six wildlife refuges in five States under the sole jurisdiction of the Department of Agriculture.

Conservation: Threatened species

Pough, Richard H. An inventory of threatened and vanishing species, pp. 599-604.

Pointing to the extermination of the great auk, Labrador duck, passenger pigeon, Carolina parroquet, and heath hen, the author emphasizes the danger of the same fate overtaking the California condor, ivory-billed woodpecker, roseate spoonbill, whooping crane, and others. Effective action includes protection, provision of adequate suitable environment (for the appraisal of which in each case research may be necessary), and guardianship of each species by an agency definitely responsible for its preservation.

Conservation: Waterfowl, Canada

Lloyd, Hoyes. Canadian comment on waterfowl, 1936, pp. 180-183.

Devastating effect of drought on the great plains breeding grounds; areas once ideal for waterfowl were completely dry in 1936. The black duck, a northeastern breeder, made a strong recovery after great losses due to the abnormally severe winter of 1933-34. The eider also has responded well to improved protection. Increased restrictions on shooting privileges in Canada; necessity of gradual accomplishment in this respect concurrent with advance in public opinion which cannot be had without a continuous campaign of education.

Conservation: Waterfowl, United States

Lincoln, Frederick C. The waterfowl situation, pp. 168-179.

Limited extent of the effective breeding range of game ducks, an area greatly impaired and reduced by settlement and its accompaniments. Methods used in inventory of the stock including breeding ground survey and winter count. Evidence as to status of the waterfowl population from studies along the migration routes and in Mexico. There has been a definite improvement since the low of 1934 but enormous areas in the north still support but a fraction of their total capacity in ducks and geese.

Conservation: Wildlife, Canada

Lloyd, Hoyes. Wildlife conservation in the Northwest Territories of Canada, pp. 184-187.

Introduction of improved firearms and traps increased destruction of wildlife. Establishment of refuges as Wood Buffalo Park, Thelon Game Sanctuary primarily for musk-oxen, and the Mackenzie range for reindeer. Law enforcement in the region. Value of furs in fiscal year 1935 and numbers of skins of five species reported.

Conservation: By Women's Clubs

Bogert, Mrs. H. G. The conservation program of the General Federation of Women's Clubs, pp. 126-133.

The General Federation of Women's Clubs has interested itself in wildlife conservation since 1898 and has joined in many subsequent efforts to obtain protective legislation. The Federation wants politics kept out of conservation and the movement directed for the benefit of all citizens. Education is recognized as of primary importance and compulsory education in conservation is urged in all States. The Federation insists on care, understanding, and vigilance on the part of those in control of wildlife. There is a general interest in small refuges for waterfowl which the Federation fosters. Activities for club study in wildlife are listed. By participation in a reforestation campaign ("A Federation memorial forest in every state--an acre for every club"), the Federation is building up wildlife resources. Its program is chiefly one of education through a program correlating human welfare with conservation.

Cycles: Water levels

Wing, Leonard W. Cycles of water-levels, pp. 346-379, 12 figs. (graphs), 16 tables.

Rainfall is cyclic and is correlated with fluctuations in sunspot abundance. "This paper is an attempt to interpret the results of rainfall study in terms of wildlife." Records from stations in or affecting the Mississippi flyway are tabulated and graphed. The author concludes: "A definite downward trend in the rainfall since the middle of the last century seems established beyond a doubt. Its influence upon water levels and consequently waterfowl seems sufficient to warrant more than a passing glance. If we are in the midst of the low of the long-time cycle, there is little immediate hope for relief from its effect. Our whole efforts must be concentrated upon conserving the maximum amount of water and of obtaining the maximum benefit from the water we are fortunate enough to receive." Bibliography of 22 titles.

Cycles: Wildlife

Wing, Leonard W. Further studies of wildlife cycles, pp. 326-339, 7 figs., 5 tables.

Quotation of two paragraphs may suitably abstract this paper. "The evidence accumulating on cyclic fluctuations in wildlife leads to the conclusion that it is no longer safe to label any animal as non-cyclic without

exhaustive study of its population levels; and that it is no longer safe to label any factor as the cause of the cycles on the basis of correlation with the cycles. The problems of population cycles are extremely complex and in need of more study before any conclusions can be given with justifiable finality."

"Numerous correlations occur between wildlife, solar and meteorological data and other phenomena. While these correlations are apparently true, it is not possible to assign any definiteness nor cause and effect to any of them with precision. The unknown factors are too great in the face of our present knowledge of wildlife to assign a role to each of the possible affecting agents. The general correlation between so many separate phenomena furnishes strong testimony that the roughness of the data and sketchy knowledge of wildlife is being transcended by phenomena of great magnitude and that the fluctuations are being guided by forces other than accident."

Application of cycles in climatic phenomena to fluctuations in numbers of woodcock, bobwhite, and ruffed grouse are pointed out. There is a bibliography of 7 titles.

Destruction: Habitat for wildlife

Ligon, J. Stokley. Tragedy of upland game birds throughout the West and Southwest, pp. 476-480.

A leading reason for the tragic plight of wildlife is the typically American abuse of perishable national resources. As applied to upland game birds, habitat has been steadily deteriorated by overgrazing, clean farming, and other exploitation, until now the birds in most sections must resort to abnormal habits and to artificial sources of food in order to survive. Little is being done to restore good living conditions and the more popular restocking ventures are doomed to failure "as restoration of habitat must precede restoration of game." The inadequacy of environment leads to concentrations of game in favored spots, gatherings that are misinterpreted by hunters as samples of a bountiful supply. A reformed land-use program is necessary; efforts toward that end in New Mexico are mentioned; and the necessity of cooperation by all interested parties pointed out. Even "if beneficial wildlife can be restored to all available range, once it is revegetated through controlled grazing and proper game management, there will be little enough game to meet the demands of the future." [Ligon's remarks, in many respects like those of the much-castigated nature lovers, are commended to those whose sports include heaving rocks at "sentimentalists", for Ligon, a career-long collector and hunter, employed years in the predatory animal and rodent control work of the Biological Survey, and now a game farmer and game specialist, can hardly be classed as a sentimentalist. Yet he shows the same alarm at the appalling depletion of our fauna and calls for some of the same remedies.]

Destruction: Lead poisoning

Shillinger, J. E., and Clarence Cottam. The importance of lead poisoning in waterfowl, pp. 398-403, 2 tables.

Action of digestive system leading to lead poisoning, symptoms, lesions. Older records of the trouble and notes on several more recent instances. Tabulation of the frequency of occurrence and number of shot found in duck stomachs examined in the Biological Survey. Conditions favoring ingestion of shot are widespread and about half of the waterfowl sent to the Biological Survey for determination of the cause of death are found to have died from lead poisoning. Losses occur mainly among adult birds, survivors of the hunting season, hence are important as cutting down essential breeding stock.

Disease: Sylvatic plague

Day, Albert M. Sylvatic plague, pp. 555-560.

Sylvatic plague is carried by native animals, bubonic plague by domestic rats; they are regarded as phases of the same disease. Review of outbreaks of plague, particularly those of fairly recent date. Diagnosis of sylvatic plague by species of rodents and localities in the Western States. The disease probably cannot be eliminated but its principal menace might be removed by maintaining zones free of carriers about cities. Local control reduced the prevalence of relapsing fever carried by chipmunks and may prove equally helpful in controlling restricted outbreaks of sylvatic plague. "At the present time there is not much danger of large numbers of human beings contracting plague of the bubonic type from wild rodents, as the deaths have averaged only one or two a year. This form is transmitted to man chiefly by insects. Authorities fairly well agree, however, that where there is a sylvatic-plague epizootic among rodents, the chances for an outbreak of the pneumonic type of plague are greatly increased. The pneumonic type may be transmitted from man to man, is highly infectious, and, like influenza, is difficult to control. The dangerous possibilities of the disease must not be minimized."

Diseases and Parasites: Shared by livestock and wildlife

Shillinger, J. E. Disease relationship of domestic stock and wildlife, pp. 298-302.

Wildlife has much lower tolerance of unsanitary surroundings than does livestock and cannot be successfully propagated when crowded or exposed to disease. On the other hand, livestock has acquired no doubt from American wildlife certain parasites unknown in its place of origin--the Old World; these, however, are not known to be seriously destructive. Transfers in the opposite direction, on the contrary, have resulted in great losses, as from canine distemper on fox farms and various poultry diseases in upland game bird propagating establishments. Among wild animals the situation is even more serious as illustrated by the history of necrotic stomatitis and of foot-and-mouth disease among native ruminants. Tuberculosis, Bang's disease, and rabies are other dangerous diseases introduced to American wildlife. Contamination of range may have been an important factor in the local extirpation of certain big game, especially mountain sheep. Scabies and actinomycosis are known to have been involved in some of these instances. It is conceivable that if intermingling is not ended certain important wild game may suffer complete extinction.

Ecology: Animal relations to soils

Van Dersal, Wm. R. The dependence of soils on animal life, pp. 458-467.

This paper previously published by the National Association of Audubon Societies was abstracted in WILDLIFE REVIEW, No. 9, July 1937, p. 11.

Ecology: Crow-waterfowl relationships

Kalmbach, E. R. Crow-waterfowl relationships in the prairie provinces, pp. 380-392, 1 table.

A paper based largely on U. S. Department of Agriculture Circular 433, "Crow-waterfowl Relationships," by the author, which was abstracted in WILDLIFE REVIEW, No. 10, October 1937, pp. 9-10. There is additional comment especially that deprecating undue extension of the findings which may well be cited. The problem is limited geographically and, except for minor colonies of ducks on northeastern and northwestern coasts, is restricted in this country largely to the States of Minnesota, North Dakota, South Dakota, northern Nebraska, and Montana. In Canadian territory, not more than a sixth of the area occupied by breeding ducks and geese is also inhabited by a potentially destructive crow population. The author urges that the results of a very local study in Canada should not be construed as average for the whole Dominion nor interpreted as representative of crow-waterfowl relationships throughout this country. [As could have been foretold by anyone acquainted with the habits of propagandists, these "must nots" have already been perpetrated.]

The author admits the need of local repression of crows but points out how it should be safeguarded. "Crow control operations on duck-breeding grounds should by all means be kept in the hands of those who fully recognize the hazards associated with human intrusion on waterfowl grounds during the nesting season. They should not be carried out haphazardly or by mass action devoid of careful supervision. There should, in fact, be solicitude for the privacy of every nesting duck. At winter roosts, where control is possible at a lower cost per bird, the benefits with respect to waterfowl are in turn less direct, since only part of the birds present at these roosts actually enter the problem of crow-waterfowl relationships on the breeding grounds.

"For the present, and probably for years to come, such control may wisely be restricted to those Federal, State, or privately managed areas to which crows have been attracted in unduly large numbers by the presence of nesting waterfowl and on which the consequently delicate problem of control may be kept in experienced hands. It is only under such conditions that we may effectively determine its ultimate value and economy in terms of increased waterfowl yield. There is nothing, however, in the results of this study at this time that will warrant the prophecy that a nation-wide, intensive, anti-crow campaign will bring benefits in the form of an appreciable increase in the continental supply of wild fowl."

Ecology: Grazing in relation to duck nesting

Bennett, Logan J. Grazing in relation to the nesting of the blue-winged teal, pp. 393-397, 3 tables.

Reporting on observations on a bluegrass tract bordering a lake that has been under observation since 1933, the author states that grazing one cow per 6 acres in normal years appears to be beneficial to duck nesting areas in Iowa. The benefits are in making trails that broods seeking the water can traverse easily and in keeping down populations of skunks and badgers, animals that destroy some nests.

Ecology: Populations, quail on cutover land

Lay, Daniel W. Some relations of bobwhite quail to second-growth pine woodland in Walker County, Texas, pp. 575-578.

Author's summary:

"1. Opening up the woodland by cutting pine timber starts a series of changes in vegetation that may be grouped in four stages: sprout and seedling from about 1 to 4 years after cutting; early intermediate from about the fifth to the ninth years; late intermediate from about the tenth to the fourteenth years; and mature after the fourteenth year. In the mature stage the sapling pines begin to overtop and dominate other species; in the late intermediate stage broomsedge and associated grasses reach a climax and then weaken as the brush thickens. Weed-type herbaceous species are most vigorous in the early intermediate and sprout stages. In the sprout stage the herbaceous species make steady increases each year along with the sprouts and seedling trees.

"2. Quail also seem to fit this four-stage classification. Census areas totaling 4,749 acres of interior pine woodland show averages in acres per covey of 140.6 for the first four years, 78.9 for the fifth to ninth years, 95 for the tenth to fourteenth years, and about 546 for the older tracts of woodland. A majority of the coveys in the last two age groups was in or near old clearings with vegetation similar to that of the early intermediate stage.

"3. Dogs were of little use for census of quail in large tracts of woodland. Well organized drives with CCC men gave satisfactory counts of coveys but not of covey size.

"4. Proper control of the vegetation in order to maintain the conditions of the early intermediate stage would certainly extend the period of highest concentration of quail in cutover pine woodland similar to that of Walker County, Texas."

Ecology: Populations, quail on small farms

Lehmann, V. W. Quail and cover on three Central Texas farms, pp. 570-574.

"Case histories" of farms of 36, 75, and 165 acres on which the quail population was censused and changes in cover and food conditions noted for 9, 9, and 6 years, respectively. Running account of the observations is given. The conclusions drawn are as follows: "(1) Quail populations may be expected to fluctuate rather markedly on small tracts. It appears that annual winter populations are greatly influenced by habitat changes resulting from cover manipulation; (2) an annual increase or decrease in the winter population is seldom directly proportional to the quantity of cover which has been changed; (3) the habitability of individual covey territories appears sometimes to depend on the existence of certain strategically located clumps of 'key' cover. That protective vegetation which for lack of better name has been termed 'key' cover may be a small plum thicket; a single brush pile, or a vine-covered tree; (4) quail as a species seem remarkably adaptable to changes in their habitat. Quail, however, seem adaptable only to a certain point which varies rather considerably in the case of individual coveys; (5) on small individual tracts the annual winter populations are seldom directly proportional to the number of seed stock which have survived the previous hunting season; (6) it appears that the influence of annual shooting on quail increase is not easily evaluated from fall and winter counts of quail populations on small individual tracts; (7) on any single tract, the effects of hunting pressure are modified in accordance with the percentage of kill on neighboring areas; (8) quail populations seemingly tend to 'level out' in the interim between hunting seasons; (9) winter quail populations at nearly the same level for periods of several years are not thought to be accurate measures of the carrying capacity of small tracts; (10) suitable habitats and moderate harvests are the best, but not absolute guarantees of annual winter populations on individual small farms."

Ecology: Range biota

Vorhies, Chas. T. Inter-relationships of range animals, pp. 288-294.

Bearing of remarks restricted to the southwestern semi-arid region; not only all the animals but both animals and plants have inter-relationships. The removal of single species may cause disturbance of the whole complex. The philosophy of range management should be the balancing of species, one against another for mutual control, rather than the elimination of particular species that offend us. Discussion of insects and rodents as consumers of vegetation and of predators, both avian and mammalian, as destroyers of the plant-eating forms. Examples of sphinx moth larva and grasshopper destruction by Swainson's hawks. "Control," admittedly necessary at times, is overdone and often economically unjustifiable. Growth in appreciation of the importance of the biotic complex is recognized but a great deal more is needed. Increased research is indispensable to sound management. What is required above all is real interest in, and love of, nature to replace so far as possible the "killing madness."

Ecology: Small mammals

Komarek, E. V. Mammal relationships to upland game and other wildlife, pp. 561-569, 1 graph.

The author considers that exploitation of land in the Southeast has materially affected the composition and distribution of the mammalian fauna and doubts that reverted areas will return to their original condition. The cotton rat consumes quail eggs and this species and other rodents compete for food with upland game. So-called "buffer" populations may increase rather than restrict predation by attracting predators. Desirability of local study of predation where conditions are well understood. Neither predators nor carriers of parasites should be eliminated until that is shown to be the proper course by a much more detailed knowledge than we now have as to how they fit into the web of life. The author is studying life histories of various mammals and has made most progress with that of the cotton rat. This species is cyclic with a period of 4-5 years; the cause of the die-off has not been determined. There is also a regular yearly drop in numbers in the spring. Comment on methods of estimating populations of small mammals.

Economics: Value of beaver

Finley, Wm. L. The beaver--conservor of soil and water, pp. 295-297.

Trapping out beavers a mistake in view of their value as conservors of soil and water. Removal of 600 beavers from a valley in the Ochoco National Forest, followed by disappearance of their dams, reduced pasturage from 15,000 tons worth from $5 to $5 a ton to a few hundred tons. Good trout streams disappeared, the water supply lessened, requiring expenditure for wells and ruining farms dependent on irrigation. The trappers got about four or five thousand dollars in one year, the stockmen have lost $50,000 a year ever since. This instance shows that while a dead beaver may bring $10 to $15, a live one is worth $300. The beaver doesn't fit in some communities but should be moved, not killed. By this method the number of small storage reservoirs in eastern Oregon is being increased, thus gradually building up a wealth in water resources that was once destroyed.

Education: Conservation principles

Emerson, Arthur S. Educational phases of conservation research, pp. 119-125, 1 table.

with

Opportunities for work/game commissions, planning councils, colleges, extension services, 4-H clubs, farmers, and sportsmen. Need of annual inventory of wildlife and of a unified system of taking it. Principles of conservation: "(1) In order to have an increasing return the annual take must be less than the annual increase; (2) natural reproduction is the most economical and continuous method of increasing wildlife. Artificial propagation applies where the wildlife population is too low to build back; (3) inferior strains of a species of animal, of bird, and of fish should not be bred for restocking; (4) these inferior forms should be taken during the open season in preference to the perfect specimens until a better blood line is developed; (5) pregnant or breeding beasts, nesting birds, and spawning fish should not be taken; (6) all wildlife should have unmolested breeding grounds;

(7) the shooting of females in big game should not be tolerated when increasing returns are desired. When the carrying capacity of an area is reached then management must limit both sexes; (8) coveys should not be shot to the last bird." Wildlife must be dealt with as a crop.

Education: Extension in wildlife restoration

Bode, I. T. Extension work in wildlife restoration, pp. 62-67.

Employment of an extension biologist by the U. S. Extension Service and of full-time extension specialists by Iowa and Texas. Through 4-H clubs in 1935, a hundred thousand boys and girls took some part in conservation activities. Recognition of the dominating factor of land ownership; the need of fundamental knowledge for land-planning. Plans for wildlife extension from both the Federal and State points of view.

Education: Wildlife extension

Callender, R. E. Wildlife extension work in Texas, pp. 190-193.

Conservation has been the keynote of farm demonstration work since the beginning, hence the program easily accommodated a wildlife addition. Texas wildlife had a value of 94 million dollars for the year 1935. Management demonstrations must reach the man who controls the land. They are carried on by county agents under agreements with landholders to conserve and increase desirable wildlife on areas marked by protective signs showing the cooperative nature of the project and its connection with the Texas Agricultural and Mechanical College. Programs are adopted by associations of landowners. Half a million acres in 3 counties were organized in two months.

Food Habits: Acorn consumers, inter-relations

Lay, Daniel W., and Hilbert R. Siegler. The blue jay as link between acorn and quail, pp. 529-531.

Blue jays break open acorns, thousands under single trees, thus making fragments available to quail. In Walker County, Texas, their influence is superior in this respect to that of hogs and squirrels. The article contains quantitative data on production of acorns and on fragmentation of these by jays and hogs.

Food Habits: Deer browse, Kaibab

Julander, Odell. Utilization of browse by wildlife, pp. 276-287, 2 charts, 1 table.

Browse assumes great importance as being the chief food on winter range, the capacity of which is often the limiting factor on big game populations. Degree of utilization of browse is the best criterion as to density of the consuming population and is more easily reckoned than is the number of the

animals. This study was made on the once seriously overpopulated Kaibab National Forest. A table is presented showing the preferences of deer, cattle, and sheep for the important forage plants. Key species in management of the range for deer are aspen and cliffrose. The tolerance of these species for browsing was studied by means of exposure to deer until the desired degree of utilization was effected and also by clipping experiments. Aspen, 65-70 percent utilized, still made gains in both height growth and shoot production. Cliffrose also withstood about the same percent of utilization and browsing up to 65 percent is beneficial in stimulating growth of this plant.

Food Habits: White-tailed deer, N. C.

Stegeman, LeRoy C. A food study of the white-tailed deer, pp. 438-445, tables.

Studies on the rather heavily populated Pisgah Forest, N. C. Notes on methods used and on palatability ratings obtained; leaders in this respect for the summer season, among trees were basswood, chestnut, sourwood, and dogwood; and among shrubs and vines, pepperbush, grape, and two species of greenbrier. As to quantitative forage value in oak-chestnut forest, chestnut, red maple, dogwood, and red oak ranked highest. There are a number of general observations on the effects of the deer population on the forest, and on adaptability, habits, and management of the animals.

Life Histories: Cottontail, Connecticut

Dalke, Paul D. A preliminary report of the New England cottontail studies, pp. 542-548.

Arrangements for collecting specimens; method of preserving skins. Study of flat skins shows one molt a year after the breeding season. Pregnancies were noted from April to August; the number of embryos averaged 5.2, of young in nests 3.8; two or three litters per season are commonly produced. Parasitism is usual; external and internal parasites identified are listed. Trapping and tagging studies indicated an activity range in fall of .5 to 1.8 acres. The average weight in fall of females was 2.78 pounds and of males, 2.63. Grasses and clovers were the most important summer foods. Better interspersion of food and cover tracts, the greatest need, is the special object of management studies.

Life Histories: Cottontail, Iowa

Hendrickson, George O. The Mearns' cottontail in Iowa, pp. 549-554.

When protection was given rabbits, complaints of damage multiplied, but when the remedy was proposed of trapping the animals and moving them elsewhere, the complainants mostly decided to keep the bunnies. Valuable trees were protected by cylinders of fine wire mesh or by using food supplies (clipped branches) to lure the animals away from the orchards. A rabbit shortage invited attention to diseases and parasites; the findings are informally noted Some of the cottontail shortage may have been due to increased predation by

foxes facilitated by destruction of cover by the grasshoppers and chinch bugs that were so abundant during abnormally dry years. Neither rabbits nor other vertebrates were killed by the poisoned bran used in controlling the grasshoppers. Cover is of great importance in holding cottontails; the value of different kinds is commented upon, as is also success in getting farmers to provide cover. Bibliography of 6 titles.

Life Histories: Hungarian partridge nesting

Hawkins, Arthur S. Hungarian partridge nesting studies at Faville Grove, pp. 481-484.

Nesting densities (rarely exceeding a bird to 6 acres) in North Central States are lower than reported elsewhere, so search was made for a reason. In Wisconsin the birds prefer natural cover but losses in roadside cover are almost as great as those in hayfields, which are regarded as the most hazardous environment. Notes are given on the vegetation of nest sites, numbers of nests found in different environments, and the losses in each, but admission made that little light has been thrown on the initial problem.

Life Histories: Muskrat

Errington, Paul L. Habitat requirements of stream-dwelling muskrats, pp. 411-416.

Account of observations, chiefly in Iowa, showing the vital importance to the animals of permanent pools in streams and of suitable sites for burrows; also recourses of the animals during floods.

Management: Deer weights and measurements in relation to

Johnson, Fred W. Deer weights and antler measurements in relation to population density and hunting effort, pp. 446-457, 8 tables.

Weighing and measuring deer on the Allegheny National Forest in Pennsylvania demonstrated that density of population, food shortage, and physical deterioration are correlated. Studies of the effect of hunting on deer populations in California show the value of statistics on age classes, weights, etc., in connection with management.

Management: Farmer-sportsman relationship

Hicks, Lawrence E. The controlled hunting areas and the pheasant refuge management system in Northwestern Ohio, pp. 589-598.

This paper as released by the Ohio Wildlife Research Station was abstracted in WILDLIFE REVIEW, No. 8, April 1937, pp. 21-22.

Management: Forest game

Shantz, H. L. Sociology of a forest unit, pp. 311-325.

Geological and climatic influences are described to introduce this ecological varying to economic treatment of a somewhat idealized National Forest region of the Southwest. The natural production of the area is discussed in relation to the support of a human population. In an advanced pastoral stage conflict between game and domestic stock becomes pronounced and the forester, confronted with such problems as well as by those peculiarly his own, must find a way to harmonize the needs of wildlife with those of two great industries, lumbering and grazing. To prevent deterioration, range managers when estimating carrying capacity should take into consideration average or even the worst years with respect to food supply. The interactions of wildlife populations also require constant use of a factor of safety with respect to utilization. Relation of human population to wildlife, control of hunting, and management of game species so as to maintain optimum populations. Under its multiple-use program, the Forest Service makes adjustments to fit conditions but the carrying capacity of the range must remain the measure of its use and pressure for game or livestock privileges must not force a destructive use of this natural resource. Resume of Olson's study of range competition phenomena in Utah, including a comparison of revenues derived from hunting and from cattle-raising: $50,000 to $80,000. A large number of people are interested in the hunting. "It is a difficult task to determine the commensurability of the various interests and yet hold true to the principles of the best use of land and not permit destructive use."

Management: Fur resources

Oakes, R. S. Wildlife restoration and the American Trappers Association, pp. 531-535.

Repetition of the main planks of the platform which was reproduced in WILDLIFE REVIEW, No. 6, November 1936, pp. 19-20, and addition of supporting arguments. A live and let live discussion of sportsmanship.

Management: Fur resources

Schiele, S. M., Chairman. [Resolutions by the Fur Resources Management Section], pp. 523-525.

Slightly abbreviated, the resolutions are:

"1. That the economic and social value of fur animals as a natural resource be more generally and specifically recognized by state and federal governments and that it receive financial support for development from state and federal governments commensurate with its importance and value. x x x

"2. Inasmuch as basic statistical data essential to intelligent fur resource management has been heretofore impossible of attainment, we recommend that state and federal governments cooperate in a survey of the latent as well as visible supply of fur animals and we also suggest as the first step towards

this end, that the states inaugurate a reliable system of recording the annual catch of fur animals.

"3. It is recommended to the states that their trapping laws be amended to segregate trapping from hunting and fishing by the issuance of trapping licenses to trappers at a reasonable fee, and that said fee be used for the purpose of promulgation and propagation of fur animals in said states.

"4. In order to enhance the economic value of fur resources in the administration of public lands, we urge that surveys be made by appropriate governmental agencies of areas in the Public Domain adaptable as, or affording suitable, habitats for fur animals, and, further, that such areas in so far as practicable be devoted to developing and maintaining this natural resource.

"5. That in particular no reclamation, irrigation, or drainage projects shall continue to be undertaken without the approval of the Biological Survey after this organization has determined the effect of such projects upon the natural supply of fur animals on the land under consideration.

"6. That the appropriate authority in the federal government be urged to gather statistics of the take of fur because this return is essential if this great natural resource is to be safeguarded adequately.

"7. We approve of the reduction of the use of poison by the government in predatory animal control, and recommend that this reduction should be continued and that other methods less questionable from the standpoint of conservation should be attempted. We further recommend that predator control be strictly limited to areas in which depredations are of severe consequence.

"8. We recommend an open season of not more than two months in the prime-fur season of any year, with due allowance for exceptions rendered necessary by local conditions.

"9. Realizing that some states have a closed season on fisher, wolverine, and marten, we recommend a closed season of at least five years' duration throughout the entire country on these animals. x x x

"10. We deprecate the activities of dealers in illicit furs, especially beaver, and suggest continuance of the aggressive policy on the part of the government with which the raw fur trade at large will cheerfully cooperate.

"11. We heartily endorse the development of fur-animal production on farms as well as the restoration and conservation of these animals in the wild as a means of increasing the income to agriculture.

"12. We strongly urge that the project of conservation education in respect to fur bearing animals in the public schools and in all other junior activities shall be carried forward."

Management: Harvesting muskrats

Pancoast, John M. Muskrat industry in southern New Jersey, pp. 527-530, 3 tables.

Acreage of marshes in 5 counties of New Jersey; size of holdings in Salem County. Best foods cattail and three-square; tidal conditions; trapping customs. The normal annual catch for marsh is 3-1/2 muskrats, and for ponds, 6, per acre. The catch of two marshes for 10 and 13 years, respectively, is reported, mostly in percentages of the normal take. Storm tides and severe weather decimate the animals; foxes recently introduced kill a good many, and caterpillars sometimes make serious inroads on the food supply.

Management: In national forests

Shantz, H. L. Wildlife on the national forests, pp. 134-144.

Sketch of the distribution and extent (200,000,000 acres) of 154 nation forests. Interest in wildlife of the forests has steadily grown and for about 20 years the Forest Service has been making special studies as a basis for administration of wildlife. Summary of a report on the years 1933-35 that has been published elsewhere (see WILDLIFE REVIEW, No. 4, June 1936, p. 2). Wildlife population of the forests in 1935, number and extent of refuges, and need for additional winter range. In the past year, 83 men have been employed in the national forests on wildlife assignments. Eight of the 10 Regions have men to head up the wildlife work for these districts as a whole. In addition, about 1,500 regular employes are giving wildlife a prominent place among their regular duties and activities. Cooperation with the Biological Survey and Bureau of Fisheries. Account of principal achievements in wildlife work in 9 forest regions.

Management: In national parks

Russell, Carl P. Opportunities of the wildlife technician in national parks, pp. 68-77.

The greatest problems in this field arise from joint occupancy of park areas by wildlife and by people. History of wildlife studies and management in the National Park Service and outline of projects for 9 of the parks. Cooperative and research work and plans for the future; recreational surveys; desirability of publication of the results of wildlife investigations.

Management: Pheasant, Pennsylvania

Gerstell, Richard. The status of the ringneck pheasant in Pennsylvania, pp. 505-511.

A condensed account of studies of this bird now occurring in agricultural sections of every county of the State; the first successful colonization was in the early 1890's. The stock is a mixture of two species, three subspecies, and one mutant; male birds killed in November weighed from 2 to 3.82 pounds (average 2.87); the annual kill approximates 250,000 cock pheasants,

and the population has in recent years remained about stationary. Areas having high population densities are described; they seem to be correlated with outcrops of limestone; reason unknown. Discussion of damage to corn and tomatoes, and destruction of young quail and rabbits (scarcely credited), and the offsetting consumption of Japanese beetles. The daily bag limit appears to be the legal restriction which has played the major role in curtailing the kill. Staggered seasons apparently result in greater kills than straight seasons of the same length. Results of stocking policies and changes in them are discussed.

Management: Planting for erosion control and wildlife

Stevens, Ross O. Making erosion control benefit wildlife, pp. 268-275, tables.

Working under cooperative agreements with farmers, the Soil Conservation Service tries, wherever practicable, to mould regular farming operations so that they will benefit wildlife, to develop and maintain sufficient areas on each farm so that the basis of a permanent wildlife program may be established, to familiarize farmers with general wildlife management principles, and to develop an appreciation of wildlife values so that the work will be continued. Recommendations of the Service to forward these ends in the Southeast are described; from 2 to 10 (averaging 3 to 6) percent of farm areas are involved where permanent wildlife management is the objective. Income from leasing of shooting rights may amount to 10 cents per acre for the entire farm, hence remuneration for the small proportion of the land actually devoted to wildlife may be relatively high. Treatment of gullies, gall spots, and other eroded areas as well as of land retired from cultivation is described and the plants used for the purpose, and rate and season of seeding, specified. Woody plants suitable for various sites also are recommended. These matters are presented in greater detail in the author's Farmers' Bulletin 1788, "Wildlife Conservation Through Erosion Control in the Piedmont" (abstracted in WILDLIFE REVIEW, No. 11, February 1938, p. 23). Ninety out of 103 farmers signing cooperative agreements are actively participating in wildlife work.

Management: Planting, general principles

Whittaker, H. L. Natural vegetation in soil conservation and wildlife management, pp. 468-475.

A discussion from the ecological point of view of the effects of erosion, of a land-use program covering wildlife interests, of wildlife management especially planting as part of that program, and the value of preparatory surveys.

Management: By public and private agencies

Bennitt, Rudolf. Development and maintenance of food and cover--where and by whom?, pp. 264-267, tables.

From a table of land uses in Missouri, the author computes that considerably less than half of the area of the State can ever be used for active development of game food and cover. From figures on land ownership, he concludes that of the manageable game range only about 28 percent of the area of the State is in private holdings. Increasing public and dwindling private responsibility for game management is indicated. Poorer lands tend to gravitate to public, richer tracts to private, ownership. The various land-managing agencies should go forward together, each developing management policies suited to the land and game under its control and each aware of its limitations.

Management: Refuges, in Mexico

Zinser, Juan. Big Bend International Park, pp. 9-12.

Treaty for the establishment of international parks. Objectives include conservation of wildlife. Proposals for making a refuge of a strip 15 miles each side of the international boundary, and for other special reservations for migratory birds and big game. Status of bighorn sheep in Mexico. Overgrazing in relation to deer; reserving areas for deer; and prescribing rotation of grazing under which the cattle graze in a large circle so that when they come back to where they started, the grass has grown again. List of national parks of Mexico and notes on forest reservations.

Management: Soil Conservation Service

Holt, Ernest G. Soil and wildlife conservation--a report of progress, pp. 78-82.

Soil and moisture conservation are prerequisite to wildlife conservation and a great deal can be done for wildlife through appropriate direction of the operations necessary for the conservation of soil and moisture. The factors most responsible for the destruction of vegetation and consequent erosion are tillage, overgrazing, and logging followed by fire. The fortunes of soils, plants, and animals are inextricably bound together. The single soil conservation measure of greatest importance to wildlife welfare is the elimination of domestic stock grazing from critical areas. More than half a million acres have been protected from grazing, and more than 100,000 acres have been returned to tree-growing. Fifty thousand miles of terraces, which make good travelways for wildlife, have been constructed. Some hundreds of ponds have been built and enclosed, thus protecting both water and food supplies for wildlife. More than 15 million food-producing shrubs have been planted on areas reclaimed from erosion. In excess of 8,000 winter feeding stations have been provided.

Management: Squirrels in Texas

Goodrum, Phil. Notes on the gray and fox squirrels of Eastern Texas, pp. 499-504.

About the same material as abstracted in WILDLIFE REVIEW, No. 10, October 1937, p. 20.

Management: Stocking, chukar partridge

Bade, August. The chukar partridge in California, pp. 485-489.

Climatic diversities in California, and adaptability of this bird to some of them. Up to the close of the year 1936, 4,600 had been propagated and released; some are known to have bred in the field, and to have survived in difficult situations. Captive hens have laid no fewer than from 106 to 136 eggs in a season; the species does well under domestic conditions.

Management: Stocking, Reeves pheasant

Edminster, F. C. The Reeves pheasant in New York, pp. 490-493.

Account of attempts varying in kind and in different localities to establish the species, all unsuccessful.

Management: Stocking, ring-necked pheasant

Wallace, George. Vermont's pheasant situation, pp. 340-345.

Planting of pheasants has been in progress 17 years but has never been successful in certain parts of the State. The physiographic regions and their apparent qualifications as pheasant territory are described. The Lake Champlain and Connecticut River valleys are the best areas. Apparently the investigation was precipitated by an unusual decline of pheasants in even the favorable regions, and after discussing possible causes, the author is unable to settle upon any as decisive. [The same conclusion was reached by Bump of New York; see WILDLIFE REVIEW, No. 11, February 1938, p. 10.] Wallace, however, offers an opinion, saying, "Offhand, it would seem that severer than usual climatic conditions have been the principal limiting factor." He concludes that some sections of the State are totally unsuited to pheasants, others well suited, and others intermediate in capacity. Stocking should be abandoned in the first type, continued in the second, and further experimented with in the third. [The inhumane aspect of stocking birds in areas where they cannot possibly survive seems not to have been considered.]

Management: Stocking, wild turkey

Blakey, Harold L. Wild turkey management on the Missouri Ozark Range, pp. 494-498.

Much Missouri land is suitable for wild turkeys and considerable revenue would result if it were adequately stocked. A 10-year restocking program appears to have had negative results, so improvement is being sought through changed practices on protected areas in national forests and by use of the best available wild strain. There is much illegal killing. For a fuller account of the matter, see Wildlife Research and Management Leaflet BS-77, abstract of which appeared in WILDLIFE REVIEW, No. 8, April 1937, p. 33.

Management: Winter feeding, advisability of

Kalmbach, E. R., and Don R. Coburn. Disease factors in reported cases of starvation in waterfowl, pp. 404-410, 1 table.

Report on field investigation and necropsies of ducks reported to be starving in winter in southern Idaho. Post-mortem examination of 90 specimens showed food present in the alimentary tracts of 58; parasitism, apparently the cause of death, was noted in 61, and mycosis, lead-poisoning, and mechanical injury in 4, 11, and 12 individuals, respectively. The mortality, hardly more severe than what may be considered normal for the season, was not primarily or even largely due to starvation. In such cases, feeding tends to concentrate parasitized and otherwise subnormal birds in spots where the still predominantly healthy birds also are attracted. There is a real danger in concentrating healthy and diseased birds day after day on the same feeding grounds and on the other hand, there is no evidence that feeding rehabilitates the ailing birds. A question is therefore raised as to whether the feeding may be not only false humanitarianism but even misguided game management.

Research: Control methods

Garlough, F. E. Research studies in the control of destructive mammals, pp. 303-310.

This paper previously distributed under the same title as Wildlife Research and Management Leaflet BS-91 was abstracted in WILDLIFE REVIEW, No. 9, July 1937, p. 36.

Research: Results of Federal-State cooperative units

Jackson, H. H. T. Some accomplishments of the cooperative research units--a summary to January 31, 1937, pp. 108-118.

Report of progress for 9 units, the oldest of which had been in operation only 17 months. Methods and accomplishments are described with particular reference to the subject mentioned in connection with the States which are treated in the order of establishment of the units: Virginia, wild turkey, bobwhite, gray fox; Oregon, small game, wildlife extension, and administration, sex ratio of deer; Iowa, cottontail, ducks, wildlife diseases, muskrat, pay shooting of bobwhite and pheasant, extension work; Connecticut, cover mapping, regulated shooting, cottontail, farm game, analysis of game kill; Alabama, mourning dove, bobwhite, white-tailed deer, waterfowl food supply; Texas, wildlife resources of Walker County, ecology of cut-over lands, quail, prairie chicken, squirrels, extension; Maine, forest-game relationships, woodcock, fish-eating birds; Utah, mule deer, beaver, sage grouse, sharp-tailed grouse, waterfowl food plants; Ohio, squirrels, controlled hunting, Hungarian partridge, pheasant, extension. A later report is abstracted in WILDLIFE REVIEW, No. 11, February 1938, p. 34.

Research: Need of

Leopold, Aldo. The research program, pp. 104-107.

A stimulative but perhaps overgloomy review of the research situation; needs in this field and in that of education of the landowners to appreciation of wildlife problems.

Research: Texas cooperative unit

Taylor, Walter P. Wildlife management demonstration on a county-wide basis, pp. 47-55.

Objectives of the Texas cooperative wildlife research unit and specifically those of the Walker County wildlife surveys, which are: "To determine what kind of game and non-game birds and mammals are present; also what other vertebrates are present, the reptile and amphibian population; so far as practicable to count them. To make representative collections of vertebrates for use in teaching and research. To observe not only what animals are present, but what they are doing; that is, to find out not only what is in the woods, but what is happening there. To bring to light former wildlife conditions so that programs for restoration and conservation may be based upon reasonable grounds. To study existing forest and farm practices with the object in view of determining how far game conservation methods can be adapted to what is now going on in the country."

Progress made in the surveys; need of diversification in natural crops; values of diversification; importance of the ecological concept and a broad view of management. Success in the work to date has largely been in development of means of doing it, including a practical method of counting quail. The relation of blue jays, squirrels, and pigs to the bobwhite, and certain other factors bearing upon the welfare of that species, have been worked out.

Research: Woodcock management methods

Aldous, C. M. Woodcock management studies in Maine, pp. 582-588.

The woodcock breeds chiefly and winters almost entirely in the United States so its fate depends upon usonian policies. The bird appears to be holding its own in the Northeast where in Maine, Nova Scotia, and New Brunswick the species breeds apparently more commonly than anywhere else. Weights ranged from 4-1/2 to 10, and averaged 6-1/2, ounces. Migrants from the north averaged 1/2 ounce heavier than resident birds. A satisfactory and economical census method has not yet been developed. Hunting appears to be more important than any natural cause of mortality, and possibly more important than all causes combined. Figures for kill in 4 States. Predators discussed; the house cat probably most important. Drouth seems to be the most destructive climatic factor. Notes on preferred cover and the necessity of clearings for mating performances.

SPECIAL ARTICLES

Plant names indicating utilization by wildlife

Among the more interesting names of plants are those embodying referenc to animals. They are of many sorts, one class of which, namely, those denotin use by animals, comprises the subject matter of this sketch. The content of the present article is further restricted to terms alluding to mammals and birds only, as being of most interest to wildlife managers. American usage also is a basic criterion for the compilation, this provision excluding numero terms seen in books that are obviously borrowed from foreign sources. It is doubtful whether any of these have real currency in the United States.

There are numerous plant names compounded from those of animals that do not indicate usage, for example such association terms as buffalo-bur and dog-town grass, those of deprecatory significance as skunkcabbage and wolfbean, an those suggested by fancied resemblances as moose elm and porcupine grass. Som are named facetiously as coyote melon (for a gourd) and wolf grape (for a nightshade), and some are misnamed as buckbean (a corruption of bogbean).

Nevertheless there is more wheat than chaff and the hope is that it is here properly sorted. An attempt has been made to indicate wildlife utiliza-tion of the plants, not necessarily restricted to that referred to in the name The abbreviations have the same significance as in U. S. Department of Agriculture Circular 412, "Groups of Plants Valuable for Wildlife Utilization and Erosion Control," namely, C-cover, B-browse, H-herbage, M-mast, F-fruit, and S-seed. Other words indicating use are spelled out.

These animal-plant terms embody the observations of people close to nature, of generations of them, in some instances, and may be taken as useful hints by the wildlife manager. The animal group that has the largest number of plant names associated with its own is that of deer with 18 entries under buck, 18 under deer, and 2 under stag, and the plant that has been named for the greatest variety of animals is Mitchella repens with appellations dedicat-ing it to 8 different birds and mammals. The plant families most numerously represented by groups with wildlife connected appellations are Gramineae, 11; Fagaceae, 11; Rosaceae, 10; Papilionaceae, 14; Ericaceae, 14; and Caprifolia-ceae, 11.

The scientific names of the plants, in the main, and their systematic arrangement follow Heller's Catalogue 2nd edit. 1900, which, strangely and regrettably, is still the latest general list of nearctic plants. Two arrang-ments of the names are presented, one alphabetically by the vernacular plant names with their scientific equivalents indented, and the other giving the scientific names in systematic order, each accompanied by the animal-derived vernaculars that have been gathered for the present paper. Additions will be appreciatively received.

Alphabetic Register

Antelope-brush
Purshia tridentata B
Lygodesmia spinosa B

Antelope-sage
Eriogonum jamesii H

Bat tree
Magnolia grandiflora C?

Bearberry
Rubus canadensis F
Empetrum nigrum F
Ilex decidua F
Rhamnus purshiana F
Garrya wrightii F
Cornus canadensis F
Arctostaphylos spp. F
Mairania alpina F
Oxycoccus spp. F
Lonicera involucrata (also called bearberry honeysuckle) F

Bearberry tree
Rhamnus purshiana F

Bear brush
Garrya fremontii F

Bear bush
Ilex glabra F

Bear-cabbage
Hydrophyllum capitatum H

Bear corn
Veratrum viride Roots?

Beargrass
Xerophyllum spp. (There are several other beargrasses, for none of which, however, does the name seem to indicate use) Roots

Bear-gum
Nyssa ursina (note scientific name also) F

Bear huckleberry
Gaylussacia ursina (note scientific name also) F

Bear lily
Xerophyllum tenax Roots

Bear oak
Quercus ilicifolia M

Bear's-bilberry
Arctostaphylos uva-ursi F

Bear's-grape
Arctostaphylos uva-ursi F

Bear's-whortleberry
Arctostaphylos uva-ursi F

Bearwood
Rhamnus purshiana F

Beaver lily
Nymphaea advena H

Beaverroot
Nymphaea advena H

Beaver tree
Magnolia virginiana B?

Beaver-wood
Celtis occidentalis B?

Birdberry
Ampelopsis arborea F

Bird cherry
Prunus pennsylvanica F

Bird pepper
Capsicum spp. F

Birdseed
Lepidium spp. S
Senecio vulgaris S

Birdseed peppergrass
Lepidium alyssoides S

	Nesting material
Bird's-nest weed	
Froelichia drummondi	
Bird's-pepper	
Lepidium virginicum	S
Bird vetch	
Vicia cracca	S
Blackbird oats	
Zizania aquatica	S
Brant grass	
Zostera marina	H
Brant salad	
Enteromorpha	H
Ulva	H
Buckberry	
Gaylussacia ursina	F
Polycodium spp.	F
Buckbrush	
Perophyllum ramosissimum	C
Dasiphora fruticosa	B
Cercocarpus spp.	CB
Purshia tridentata	CB
Lotus scoparius	B
Ceanothus spp.	BC
Elaeagnus argentea	BF
Adelia pubescens	BF
Lycium spp.	BF
Anisacanthus thurberi	B
Symphoricarpos spp.	CBF
Lonicera utahensis	BF
Buckbush	
Symphoricarpos spp.	BF
Bucknut	
Simondsia californica	BS
Buck oak	
Quercus borealis maxima	B?
Quercus coccinea	B?
Buckwood	
Acer pennsylvanicum	B

Buffalo apple	
Astragalus caryocarpus	Roots?
Buffalo bean	
Astragalus caryocarpus	Roots?
Buffalo berry	
Lepargyrea argentea	B
Buffalo bunchgrass	
Festuca scabrella	H
Buffalo clover	
Lupinus texensis	H
Trifolium reflexum	H
Buffalo currant	
Ribes odoratum	B?
Buffalo grass	
Bouteloua hirsuta	H
Bouteloua oligostachya	H
Bulbilis dactyloides	H
Buffalo nut	
Pyrularia pubera	B?
Buffalo pea	
Thermopsis montana	H
Astragalus caryocarpus	Roots?
Oxytropis lamberti	H?
Vicia americana	H
Buffalo rye	
Elymus spp.	H
Buffalo weed	
Astragalus mexicana	H?
Canvas-back duck-food	
Vallisneria spiralis	H
Canvas-back grass	
Vallisneria spiralis	H
Coon grape	
Berchemia scandens	F
Vitis labrusca	F

Coyote-bush
Baccharis pilularis C?

Crowberry
Juniperus communis F
Oxycoccus oxycoccus F
Empetrum nigrum F
Arctostaphylos uva-ursi F
Adelia porulosa F

Crow corn
Aletris farinosa Roots?

Crow pea
Empetrum nigrum F

Curlew-berry
Empetrum nigrum F

Deer berry
Ilex vomitoria BF
Gaultheria procumbens BF
Polycodium spp. BF
Mitchella repens HF
Symphoricarpos spp. BF

Deer-briar
Ceanothus fendleri CB

Deer-brush
Cercocarpus spp. CB
Purshia tridentata CB
Ceanothus spp. CB
Symphoricarpos oreophilus CBF

Deer clover
Lotus spp. H

Deer food
Erasenia schreberi H

Deergrass
Muhlenbergia spp. H
Rhexia virginica H

Deer laurel
Rhododendron maximum CB

Deer moss
Tillandsia usneoides H

Deer oak
Quercus sadleriana BM

Deer pea
Lotus spp. H
Vicia ludoviciana H

Deervetch
Lotus spp. H

Deer vine
Linnaea borealis americana H

Deer weed
Lotus scoparius B
Lotus spp. H

Deerwood
Ostrya virginiana B

Devilwood
Croton spp. S

Duck acorn
Nelumbo lutea S

Duck celery
Vallisneria spiralis H

Duck corn
Peltandra virginica S

Duck food, Blue
Echinochloa crusgalli S

Duck grass
Potamogeton pectinatus HS
Potamogeton perfoliatus HS
Ruppia maritima HS

Duck lettuce
Atriplex hastata H

Duck millet
Echinochloa crusgalli (also with prefixes blue and wild) S

Duck moss
Potamogeton pectinatus HS
Najas guadelupensis (with prefix gray, the gray duck being the gadwall) HS

Duck oak
Quercus nigra M

Duck oats
Zizania aquatica HS

Duck potato
Sagittaria spp. Tubers

Duck sparrowgrass (i.e. asparagus)
Ceratophyllum demersum HS

Duck rice
Echinochloa crusgalli S
Zizania aquatica HS

Duck's-meat (see duckweed)

Duckweed
Zostera marina H
Lemnaceae H

Duck wheat
Fagopyrum fagopyrum (trade name) S

Elk bark
Magnolia macrophylla B?
Magnolia virginiana B?

Elk browse
Magnolia tripetala B?

Elk clover
Aralia californica H

Elk grass
Carex geyeri H
Xerophyllum tenax H

Elk nut
Pyrularia pubera B?

Elk sedge
Carex geyeri H

Elkslip
Caltha leptosepala H

Elk tree
Oxydendron arboreum B?

Elkwood
Magnolia tripetala B?
Magnolia acuminata B?
Magnolia macrophylla B?

Foxberry
Arctostaphylos uva-ursi F
Vaccinium vitis-idaea F
Mitchella repens F

Fox grape
Vitis cordifolia F
Vitis labrusca F

Fox plum
Arctostaphylos uva-ursi F

Goose buckwheat
Fagopyrum fagopyrum (trade name) S

Goosegrass
Sagittaria teres H
Echinochloa crusgalli H
Triglochin maritima H
Puccinellia spp. H
Scirpus robustus H

Ground hog salad
Saxifraga erosa H

Ground squirrel pea
Jeffersonia diphylla Tubers

Grouseberry
Gaultheria procumbens BF
Gaylussacia dumosa BF
Vaccinium scoparium BF
Viburnum opulus americanum F

Grouse whortleberry
Vaccinium scoparium BF

Heath-hen plum
Mitchella repens HF

Hummingbird's sage
Ramona grandiflora Nectar

Hummingbird's trumpet
Zauschneria californica Nectar

Mallard-weeds
Lemnaceae H

Mooseberry
Viburnum alnifolium BF

Moosebush
Viburnum alnifolium BF

Moose maple
Acer spicatum B

Moosewood
Acer pennsylvanicum B
Dirca palustris B
Viburnum alnifolium BF

Muskrat potato
Sagittaria latifolia Tubers

Musquash- or muskrat-weed
Thalictrum polygamum H?

Partridgeberry
Gaultheria procumbens BF
Chiogenes hispidula HF
Mitchella repens HF
Symphoricarpos spp. F

Partridge-pea
Chamaecrista spp. S

Partridge vine
Mitchella repens HF

Peter-grass
Ruppia maritima (for the Blue Peter or Coot) H

Pheasant-berry
Mitchella repens HF

Pigeonberry
Phytolacca americana F
Amelanchier alnifolia F
Rubus triflorus F
Empetrum nigrum F
Ilex verticillata F
Rhamnus spp. F
Aralia hispida F
Cornus alternifolia F
Mitchella repens F

Pigeon cherry
Prunus pennsylvanica F

Pigeon grape
Vitis aestivalis F

Pigeon grass
Chaetochloa spp. S

Pigeon plum
Coccoloboa laurifolia F
Mitchella repens F

Pigeon-root
Claytonia lanceolata Tubers

Pigeon tree
Aralia spinosa F

Pigeonwood
Pisonia longifolia F

Possum grape
Vitis cordifolia F

Possumhaw
Ilex decidua F
Viburnum nudum F

Possum oak
Quercus nigra M?

Possum plum
Prunus minutiflora F

Possum thorn
Viburnum nudum F

Possumwood
Diospyros virginiana F

Ptarmiganberry
Mairania alpina BF

Puldoo-grass
Ruppia maritima (for the poule d'eau or coot) H

Quailberry
Symphoricarpos occidentalis CF

Quail brush
- Atriplex lentiformis CS
- Cercocarpus spp. C

Quail's-delight
- Chaetochloa italica S

Rabbitberry
- Lepargyrea argentea LF
- Mitchella repens HF

Rabbitbrush
- Cercocarpus spp. C
- Gutierrezia sarothrae C?
- Aploppappus blodgeri B
- Chrysothamnus spp. CBH

Rabbitbush
- Amorpha fruticosa H
- Gutierrezia spp. C?

Rabbit pea
- Tephrosia virginica H

Rabbit sage
- Chrysothamnus spp. HC

Rabbit's-root
- Aralia nudicaulis H

Rabbit thorn
- Lycium spp. CB

Rabbit tobacco
- Gnaphalium spp. H

Rabbit vine
- Apios tuberosa H

Rabbitweed
- Gutierrezia sarothrae C?
- Bigelovia graveolens H?

Rabbitwood
- Pyrularia pubera F?

Raccoonberry
- Podophyllum peltatum F?

Raccoon grape
- Vitis labrusca F
- Ampelopsis cordata F

Redhead-grass
- Potamogeton perfoliatus HS
- Ruppia maritima HS

Squirrelcorn
- Bicuculla canadensis Tubers
- Capnoides spp. Tubers

Stag-berry
- Symphoricarpos occidentalis BF

Stagbush
- Viburnum prunifolium BF

Swan potato
- Sagittaria latifolia Tubers

Turkey apple
- Crataegus induta F

Turkeyberry
- Ilex decidua F
- Solanum torvum F
- Mitchella repens F
- Symphoricarpos orbiculatus F

Turkey corn
- Bicuculla spp. Tubers

Turkey grape
- Vitis lincecumi F

Turkey oak
- Quercus catesbaei M
- Quercus cinerea M
- Quercus imbricaria M
- Quercus rubra M
- Quercus stellata M
- Quercus triloba M

Turkey pea
- Bicuculla canadensis Tubers
- Thermopsis montana Pods
- Tephrosia virginica Pods
- Erigenia bulbosa Tubers

Turkey pod
- Stenophragma thaliana Pods

Wigeongrass
Zostera marina HS
Potamogeton nuttallii HS
Ruppia maritima HS

Woodpecker hickory
Hicoria alba Sap

Systematic Register

ULVACEAE
Enteromorpha
Brant salad

Ulva
Brant salad

PINACEAE
Juniperus communis
Crowberry

POTAMOGETONACEAE
Zostera marina
Brant grass
Duckweed
Wigeongrass

Potamogeton nuttallii
Wigeongrass

Potamogeton pectinatus
Duck grass
Duck moss

Potamogeton perfoliatus
Duck grass
Redhead-grass

Ruppia maritima
Duck grass
Peter-grass (for the Blue Peter or Coot)
Fuldeo-grass (for the Poule d'eau or Coot)
Redhead-grass
Wigeongrass

NAIADACEAE
Naias guadelupensis
Duck moss (with prefix gray, the gray duck being the gadwall)

JUNCAGINACEAE
Triglochin maritima
Goosegrass

ALISMACEAE
Sagittaria latifolia
Muskrat potato
Swan potato

Sagittaria teres
Goosegrass

Sagittaria spp.
Duck potato

HYDROCHARITACEAE
Vallisneria spiralis
Canvas-back duck-food
Canvas-back grass
Duck celery

GRAMINEAE
Echinochloa crusgalli
Duck food, Blue
Duck millet (also with prefixes blue and wild)
Duck rice
Goosegrass

Chaetochloa italica
Quail's-delight

Chaetochloa spp.
Pigeon grass

Zizania aquatica
Blackbird oats
Duck oats
Duck rice

Muhlenbergia spp.
Deergrass

GRAMINEAE--Continued
Bouteloua hirsuta
Buffalo grass

Bouteloua oligostachya
Buffalo grass

Bulbilis dactyloides
Buffalo grass

Tuccinnellia spp.
Goosegrass

Festuca scabrella
Buffalo bunchgrass

Elymus spp.
Buffalo ryes

CYPERACEAE
Scirpus robustus
Goosegrass

Carex geyeri
Elk grass
Elk sedge

ARACEAE
Peltandra virginica
Duck corn

LEMNACEAE
Lemnaceae
Duckweeds
Mallard-weeds

BROMELIACEAE
Tillandsia usneoides
Deer moss

LILIACEAE
Xerophyllum tenax
Elk grass
Bear lily

Xerophyllum spp.
Beargrass (there are several other beargrasses, for none of which, however, does the name seem to indicate use)

LILIACEAE--Continued
Veratrum viride
Bear corn

Aletris farinosa
Crow corn

JUGLANDACEAE
Hicoria alba
Woodpecker hickory

BETULACEAE
Ostrya virginiana
Deerwood

FAGACEAE
Quercus borealis maxima
Buck oak

Quercus catesbaei
Turkey oak

Quercus cinerea
Turkey oak

Quercus coccinea
Buck oak

Quercus ilicifolia
Bear oak

Quercus imbricaria
Turkey oak

Quercus nigra
Duck oak
Possum oak

Quercus rubra
Turkey oak

Quercus sadleriana
Deer oak

Quercus stellata
Turkey oak

Quercus triloba
Turkey oak

ULMACEAE
Celtis occidentalis
Beaverwood

SANTALACEAE
Pyrularia pubera
Buffalo nut
Elk nut
Rabbitwood

POLYGONACEAE
Eriogonum jamesii
Antelope-sage

Fagopyrum fagopyrum
Duck wheat (trade name)
Goose buckwheat (trade name)

Coccolobis laurifolia
Pigeon plum

CHENOPODIACEAE
Atriplex hastata
Duck lettuce

Atriplex lentiformis
Quail brush

AMARANTHACEAE
Froelichia drummondi
Bird's-nest weed (nesting material)

PHYTOLACCACEAE
Phytolacca americana
Pigeonberry

NYCTAGINACEAE
Pisonia longifolia
Pigeonwood

PORTULACACEAE
Claytonia lanceolata
Pigeon-root

NYMPHAEACEAE
Nelumbo lutea
Duck acorn

Brasenia schreberi
Deer food

NYMPHAEACEAE--Continued
Nymphaea advena
Beaver lily
Beaver-root

CERATOPHYLLACEAE
Ceratophyllum demersum
Duck sparrowgrass (i.e. asparagus)

MAGNOLIACEAE
Magnolia acuminata
Elkwood

Magnolia grandiflora
Bat tree

Magnolia macrophylla
Elk bark
Elkwood

Magnolia tripetala
Elk browse
Elkwood

Magnolia virginiana
Beaver tree
Elk bark

RANUNCULACEAE
Caltha leptosepala
Elkslip

Thalictrum polygamum
Musquash- or muskrat-weed

BERBERIDACEAE
Podophyllum peltatum
Raccoonberry

Jeffersonia diphylla
Ground squirrel pea

FUMARIACEAE
Bicuculla canadensis
Squirrelcorn
Turkey pea

Bicuculla spp.
Turkey corn

FUMARIACEAE--Continued
Capnoides spp.
Squirrelcorn

CRUCIFERAE
Lepidium alyssoides
Birdseed peppergrass

Lepidium virginicum
Bird's-pepper

Lepidium spp.
Birdseed

Stenophragma thaliana
Turkey pod

SAXIFRAGACEAE
Saxifraga erosa
Ground hog salad

GROSSULARIACEAE
Ribes odoratum
Buffalo currant

ROSACEAE
Crataegus induta
Turkey apple

Amelanchier alnifolia
Pigeonberry

Peraphyllum ramosissimum
Buckbrush

Rubus canadensis
Bearberry

Rubus triflorus
Pigeonberry

Dasiophora fruticosa
Buckbrush

Cercocarpus spp.
Buckbrush
Deer-brush
Quailbrush
Rabbitbrush

ROSACEAE--Continued
Purshia tridentata
Antelope-brush
Buckbrush
Deer-brush

Prunus minutiflora
Possum plum

Prunus pennsylvanica
Bird cherry
Pigeon cherry

CAESALPINACEAE
Chamaecrista spp.
Partridge-pea

PAPILIONACEAE
Thermopsis montana
Buffalo pea
Turkey pea

Lupinus texensis
Buffalo clover

Trifolium reflexum
Buffalo clover

Lotus scoparius
Buckbrush
Deer weed

Lotus spp.
Deer clover
Deer pea
Deervetch
Deer weed

Amorpha fruticosa
Rabbitbush

Tephrosia virginica
Rabbit pea
Turkey pea

Astragulus caryocarpus
Buffalo apple
Buffalo bean
Buffalo pea

PAPILIONACEAE--Continued
Astragulus mexicana
Buffalo weed

Oxytropis lamberti
Buffalo pea
Vicia americana
Buffalo pea

Vicia cracca
Bird vetch

Vicia ludoviciana
Deer pea

Apios tuberosa
Rabbit vine

EUPHORBIACEAE
Croton spp.
Doveweed

EMPETRACEAE
Empetrum nigrum
Bearberry
Crowberry
Crow pea
Curlew-berry
Pigeonberry

BUXACEAE
Simondsia californica
Buckmut

AQUIFOLIACEAE
Ilex decidua
Bearberry
Possumhaw
Turkeyberry

Ilex glabra
Bearbush

Ilex verticillata
Pigeonberry

Ilex vomitoria
Deer berry

ACERACEAE
Acer pennsylvanicum
Buckwood
Moosewood

Acer spicatum
Moose maple

RHAMNACEAE
Berchemia scandens
Coon grape

Rhamnus purshiana
Bearberry
Bearberry tree
Bearwood

Rhamnus spp.
Pigeonberry

Ceanothus fendleri
Deer-briar

Ceanothus spp.
Buckbrush
Deer-brush

VITACEAE
Vitis aestivalis
Pigeon grape

Vitis cordifolia
Fox-grape
Possum grape

Vitis labrusca
Coon grape
Fox-grape
Raccoon grape

Vitis lincecumi
Turkey grape

Ampelopsis arborea
Birdberry

Ampelopsis cordata
Raccoon grape

THYMELACEAE
Dirca palustris
Moosewood

ELAEAGNACEAE
Lepargyrea argentea
Rabbitberry

Lepargyrea spp.
Buffalo berry

Elaeagnus argentea
Buckbrush

MELASTOMACEAE
Rhexia virginica
Deergrass

ONAGRACEAE
Zauschneria californica
Hummingbird's trumpet

ARALIACEAE
Aralia californica
Elk clover

Aralia hispida
Pigeonberry

Aralia nudicaulis
Rabbit's-root

Aralia spinosa
Pigeon tree

UMBELLIFERAE
Erigenia bulbosa
Turkey pea

CORNACEAE
Garrya fremontii
Bearbrush

Garrya wrightii
Bearberry

Nyssa ursina
Bear-gum (note scientific name also)

Cornus alternifolia
Pigeonberry

CORNACEAE--Continued
Cornus canadensis
Bearberry

ERICACEAE
Rhododendron maximum
Deer laurel

Oxydendron arboreum
Elk tree

Gaultheria procumbens
Deer berry
Grouseberry
Partridgeberry

Chiogenes hispidula
Partridgeberry

Arctostaphylos uva-ursi
Bear's-bilberry
Bear's-grape
Bear's-whortleberry
Crowberry
Foxberry
Fox plum

Arctostaphylos spp.
Bearberry

Mairania alpina
Bearberry
Ptarmiganberry

Gaylussacia dumosa
Grouseberry

Gaylussacia ursina
Bear huckleberry (note scientific name also)
Buckberry

Vaccinium scoparium
Grouseberry
Grouse whortleberry

Vaccinium vitis-idaea
Foxberry

Polycodium spp.
Buckberry
Deer berry

ERICACEAE--Continued
Oxycoccus oxycoccus
Crowberry

Oxycoccus spp.
Bearberry

EBENACEAE
Diospyros virginiana
Possumwood

OLEACEAE
Adelia porulosa
Crowberry

Adelia pubescens
Buckbrush

HYDROPHYLLACEAE
Hydrophyllum capitatum
Bear-cabbage

LABIATAE
Ramona grandiflora
Hummingbird's sage

SOLANACEAE
Lycium spp.
Buckbrush
Rabbit thorn

Capsicum spp.
Birdpepper

Solanum torvum
Turkeyberry

ACANTHACEAE
Anisacanthus thurberi
Buckbrush

RUBIACEAE
Mitchella repens
Deer berry
Foxberry
Heath-hen plum
Partridgeberry
Partridge vine
Pheasant-berry
Pigeonberry
Pigeon plum

Mitchella repens--Continued
Rabbitberry
Turkeyberry

CAPRIFOLIACEAE
Viburnum alnifolium
Mooseberry
Moosebush
Moosewood

Viburnum nudum
Possumhaw
Possum thorn

Viburnum opulus americanum
Grouseberry

Viburnum prunifolium
Stagbush

Symphoricarpos occidentalis
Quailberry
Stag-berry

Symphoricarpos orbiculatus
Turkeyberry

Symphoricarpos oreophilus
Deer-brush

Symphoricarpos spp.
Buckbrush
Buckbush
Deer berry
Partridgeberry

Linnaea borealis americana
Deer vine

Lonicera involucrata
Bearberry (also called bear-berry honeysuckle).

Lonicera utahensis
Buckbrush

COMPOSITAE
Gutierrezia sarothrae
Rabbitbrush
Rabbitweed

COMPOSITAE--Continued
Gutierrezia spp.
Rabbitbush

Aplopappus bloomeri
Rabbitbrush

Bigelovia graveolens
Rabbitweed

Chrysothamnus spp.
Rabbitbrush
Rabbit sage

COMPOSITAE--Continued
Baccharis pilularis
Coyote-bush

Gnaphalium spp.
Rabbit tobacco

Senecio vulgaris
Birdseed

CICHORIACEAE
Lygodesmia spinosa
Antelope-brush

Duties of a Chief Forester and Game Technician with the Farm Security Administration substantially as written by Palmer L. Hahn

[The following outline of the work, prepared without thought of publication, seemed so thorough and informing that permission was sought to reproduce it, a request kindly granted by Mr. Hahn.]

I am at present [Nov. 2, 1937] with the Farm Security Administration as Chief Forester and Game Technician for the State of Delaware. I have held my present position for two years and am still employed. In this work I have had as many as 700 to 800 men working under me at one time depending on the season of the year and the amount of work to be done. My work on this project consists of the following phases of wildlife and forest management:

A. WILDLIFE MANAGEMENT
1. Laying out plans for development and maintenance.
2. Biological conditioning.
3. Research (field): Food and cover requirements, nesting areas, etc.
4. Lake and pond development and the stabilization of water or water conservation, planning and construction of wild fowl nesting islands, also spawning beds for fish.
5. Predator control and wildlife protection.
6. Nursery work: Seed collecting, planning and laying out of the nursery and supervision of planting.
7. Biological reconnaissance.
8. Mapping.
9. Drawing and tracing maps for blueprints and game findings.
10. Writing up reports on various phases of wildlife management and game findings.
11. Food and cover: Collecting, planting, improving.

B. FOREST MANAGEMENT
1. Firebreak and fireline construction, fire hazard reduction both general and along roads.
2. Nursery: Collection of seeds and cuttings for forestry and landscape purposes and the treatment of them.

3. Forest stand improvement: General silvicultural practices for weeding, thinning, cleaning, and releasing.
4. Tree surgery: Guying, pruning, and trimming of trees along roads and recreational areas and the treatment of the cuts to prevent disease.
5. Fire control: Observation towers, truck patrol, and walking.
6. Product conversion in forestry for cutting cordwood, fuelwood, poles, posts, timber, and yarding them for Government and private use.
7. Roadside improvement such as the elimination of poorly growing species to improve the general landscape.
8. Type mapping and timber cruising, including comprehensive reports.
9. Setting up money and labor quotas for all jobs on the project, including forestry, wildlife, general development, landscaping, and engineering.
10. Making of progress and development maps, tracings, and reports.
11. Laying out of foot trails.
12. Laying out and construction of roads and culverts; ditching and road maintenance.

A. WILDLIFE MANAGEMENT

1. One of the main duties is laying out plans for the development and maintenance of areas in the projects. In planning these various jobs, the following factors are given consideration: Justification from a financial, practical, and technical standpoint, and cost of materials, equipment, supplies, labor, supervision, overhead, and its relation to the money available. Key maps of the areas have the improvements marked on them as to location, usage, availability, and practicability. The land status of all properties is ascertained and in non-government land, permission secured for the work to be done. Folders are made up containing all of this information together with job or work descriptions, photographs, detailed drawings if necessary, cost analysis sheets, breakdown sheets, and job analysis statements. Every job on every area must be so described before work can proceed. After the jobs have been shown necessary and practical and money has been set up for them, the technical assistants and foremen must be instructed as to methods, little difficulties ironed out, and the necessary labor, equipment, and materials made available so that the work can proceed without undue cost and loss of time.

2. Biological conditioning consists of preparing and bettering the areas, releasing game food plants and shrubs along water, wood edges, ditches, and hedgerows. This work is done primarily for upland game such as the quail, pheasant, rabbit, and raccoon. Slash cuttings are made to bring in new growth and to increase the amount of palatable foliage for game; the slash from these operations was piled to provide escape coverts for wildlife. This work is done on the uplands and along ponds and the ocean front; in marshes it is for the benefit of muskrats and waterfowl; aquatic conditioning is essentially for migratory waterfowl.

3. Field research here consists of game food studies, finding nesting locations of game, their kind and species, and the amount of game on the area. On old abandoned farmlands, weed succession is studied especially in relation to the seed food supply for upland game. An attempt is made to learn why

various ponds have more wild fowl and fish than others. Experiments are under way on the use of west coast eelgrass as a food for brant. Studies are made a to character of bottom and the resistance to disease of the plants. A field study has been made on the food, cover, and nesting requirements of the woodcock, quail, and black duck.

4. Lake and pond development work is done here on the Atlantic coastal beach and in both fresh and salt water ponds. Spawning beds are being made fo smallmouth bass in the fresh water and cover also is provided. In our larges fresh water lake, spawning beds for black bass were constructed of logs placed in an oblong 8' by 4', fastened to the lake bottom by stakes, and the interior of the oblong filled with 6" to 8" of gravel, the top of the gravel averaging 18" below the water surface. Duck nesting islands have been made and found practical both in salt and fresh water ponds. In our small marsh ponds it has been found that small islands8' by 8' are suitable. We made them out of logs and filled the center of the crib with sand; on top of the sand we set out marsh bushes and easily grown upland plants. To attract ducks we have added coarse gravel, whole oyster shells, and crushed shell on about one-half of the top of the island. This seems to draw the ducks and with plenty of food and protection has helped increase the wild fowl population. Many small ponds als have been made on the salt marshes to serve as feeding and resting areas for migratory waterfowl.

5. After careful studies, predator control has been explained to the local farmers. This education has been followed by the control of crows, foxes cats, dogs, and snapping turtles. In order to build up the wildlife in genera a campaign has been started to enlist the local man's help, the idea being to prevent illegal hunting, fishing, and trapping. During the fire season the fire guards act as game protectors. It is with the help of the fire guards ar local farmers that we hope to protect our young stock and build up the wildlif population. So far this plan has proved effective in the case of Canada geese black ducks, and wood ducks.

6. Nursery work was started in an old abandoned field where roads were built, ground and beds prepared, frames made and set in the ground, the beds fertilized and filled, sun screens made and set in the ground, a watering system installed, and after the seeds and cuttings had been planted the nurse was watered, cared for, and weeded. It is one of the few nurseries in the United States devoted to the propagation of wild game food plants and forest tree seedlings. There are 33 species growing at the present time. Game food seeds and berries as well as seeds and cuttings for forestry and landscape purposes receive special attention. The seeds and berries are treated by spreading them on jute cloth and allowing them to dry in the sun and then storing them preparatory to planting in the nursery the next spring. A large percentage of the cuttings for forestry, game, and nursery purposes are treat with Hormodin and then set out in frames after they have calloused over.

7. In biological reconnaissance, we census upland game, migratory wate fowl, and woodcock. The data recorded daily include the date, length of the inspection, species, and numbers. In connection with this work, data is accumulated on nests, as to number, location, and species; length of nesting

time, and number of eggs. The various facts and figures are correlated and reports written in order to educate the local hunter and contribute to proper management. So far this work has chiefly concerned quail, pheasant, ducks, fox, rabbit, and squirrel.

8. Mapping: Maps are made of the findings of reconnaissance. On the maps mentioned, we record biological, game, and natural features of the various sites, including nests, feed patches, tree and shrub growth, and type of soil.

9. Drawing maps and blueprints: As work develops, we make maps and tracings to show progress. The maps or blueprints are needed both in Washington and the Regional Office. In the field they make technical direction easier and surer of accomplishment. The progress maps show the location, date, amount, and symbol of each development. The development maps show the area prior to any period of development with the proposed new features indicated on them.

10. Writing reports: This requires for all game subjects a statement giving facts, figures, and suggestions on the various phases of wildlife management that are necessary.

11. Food and cover: Food and cover plantings were made for upland game such as quail, pheasant, rabbit, and raccoon. The following were sown: Millet, lespedeza, clover, alsike, corn, oat grass, and Kentucky blue grass. On the forest edges corn and nut trees were planted for the squirrels. In the fresh water ponds, food was planted to favor forage fish for smallmouth bass, bigmouth bass, warmouth, crappie, and perch. In both fresh water and salt water ponds, food and cover were planted for ducks, geese, and coots. Collections were made of the following and replanted: Eelgrass, wigeongrass, sago pondweed, and wild celery. Wild duck millet also was planted on mud flats. Although this is a Federal project, we have enlisted the cooperation of the State and local fish, game, and forestry men.

A. FOREST MANAGEMENT

1. Firebreak and fireline construction was one of the first jobs on this project, being needed to open the area for foot travel in case of fire or emergency. The work consisted in clearing out old woods roads and property boundaries. Here all inflammable material under 6" in diameter was removed but the green and moist ground cover left. It is hoped at a later date to plow the outside boundaries throwing up the mineral soil. Along roads and in recreational areas, dead trees, diseased trees, and trees liable to windthrow were cut up to usable size and the tops piled and burned. The fire hazard along the roads was carried back 40' from the road ditches. On old logged-over areas, slash if present in large quantity, was piled and burned; if not very abundant, it was lopped and scattered. Here, as in operations along roads, dead trees and stubs together with highly inflammable material were burned or lopped and scattered.

2. Nursery work was carried out along the lines mentioned under the Game Management section. The chief trees being propagated are loblolly pine, red and white oaks, walnuts, hickories, and black locust. The seeds are collected in the fall, dried, and stored until spring.

3. Forest stand improvement covers general silvicultural practices for weeding, thinning, cleaning, and releasing. One of our areas is typical of the central hardwood type; another site is loblolly pine, both in pure stands and mixed with hardwoods; a third includes a large quantity of cypress, partly in a pure stand and partly mixed with gums and other lowland timber species. The result is that forestry practice here has a wide scope. The site having the central hardwood type is being worked to favor the red and white oaks and the red gum. On the other sites the mixtures are so good that the general practice is to cut the available timber for governmental or private use by thinnings that will allow the canopy to fill in 5 to 10 years. On areas with weed trees, releasing of the loblolly is the principle operation. On all sites check plots have been set up to obtain data on growth, density, etc. Increment borings and ring counts according to D.B.H., species, and heights have been made on two sites.

4. Tree surgery is practiced where necessary along the main roads and around recreational areas. The work includes guying valuable trees where practical. In some instances limbs are cut off, the cut surface coated with a protective covering (a shellac and Bordeaux mixture) which is moisture and disease resistant.

5. Fire control is carried on during the spring and fall dry seasons. Our set-up consists of tower observation supplemented by telephone and truck patrol on one site. On the other sites our control is chiefly by foot and truck. Gangs for fighting fires have been established and assigned territories The truck patrols carry sufficient equipment for one fire gang. The fire equipment generally consists of a flame thrower for back-firing, rakes, 5-gallon water tanks with hoses, 5-gallon water supply tanks, axes, bushhooks, and shovels. All sites have telephone communication for purposes of fire control and general supervision.

6. Product conversion is a distinct operation consisting of cutting down timber or polewood to specific dimensions for government and private use. Trees are marked for these purposes and instructions given for cutting, yarding and the selection method to be used when cutting the trees. The chief products are cordwood, fuelwood, corduroy, poles, posts, and timber to be sawed into boards. The products are piled conveniently in cribs along woods roads or main roads. They are later removed by truck, tractor, or donkey and wagon. All of our rough timber is cut for such uses as culverts, bridges, picnic tables and benches, guard rails, docks, and cribs for duck islands and spawning beds.

7. Roadside improvement is practiced along the main county roads back a distance of 40' from the inside ditch edge. The purpose of this job is to create a better esthetic appeal. In this operation diseased and poorly growing trees are removed and holly, dogwood, and serviceberry are favored wherever possible. Tree stumps are cut very close to the ground so that they can hardly be seen. This operation is intensified on or near recreational areas.

8. All the areas have been type-mapped and one has had a comprehensive 80-page report rendered covering all the data necessary in a timber cruise.

Some of the contents of the report were: a map showing the area or strips cruised and the establishment or reproduction plots in the various timber types, cubic foot contents by species of trees, D.B.H. 6" to 10" and board foot contents by species of trees, D.B.H. over 10". Experimental plot data is included on height and diameter growth in which graphs show the differences under various conditions; in conclusion the data is summarized and suggestions given for future forest management practices on the various tracts of land.

9. Periodically new jobs develop and money is set up for the development program. For these, plans must be made for money set-up, labor, equipment, and materials on all the jobs for the project, including forestry, game, landscaping, engineering, and general development. Equipment charges must be known and quotations secured for supplies and materials. These are broken down in the same way as described in the first paragraph under Wildlife. Also there is a separation for unskilled labor, technicians, foremen, and semi-skilled workers.

10. Under the head of forestry, progress reports, monthly reports, and progress or development maps are prepared. Surplus forest products are regularly inventoried and offered for sale.

11. Foot trails have been laid out on the various sites to different points of interest. These trails are cut 4' wide and sanded for 3' of their width. This treatment makes a good looking and well wearing trail.

12. Part of the jobs also is the laying out of roads and truck trails, culverts, ditching, and regular road maintenance. The road construction varies from that on swamp and muck bottoms to sandy highland.

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Sporting magazines and conservation department organs

[Supplement; previous installments in WILDLIFE REVIEW, No. 3, pp. 32-34, No. 4, p. 27, and No. 7, pp. 30-31.]

Of general scope

The Trapper. Monthly, $1.00 a year, single copy 15 cents. American Trappers Assoc., Inc., Cedar City, Utah.

Of local scope

Associated Sportsman. Monthly, $1.00 a year, single copy 5 cents. The Associated Sportsmen of California, Inc., 929 Pacific Bldg., San Francisco, Calif.

The Georgia Sportsman. 50 cents a year. Dept. of Game and Fish, 412 State Capitol, Atlanta, Ga.

Game and Fish. Monthly. State Game and Fish Commission, Jackson, Miss.

Tennessee Wildlife. Monthly, $1.00 a year, single copy 15 cents. Tennessee Federation of Sportsmen, Noel Hotel, Nashville, Tenn.

The Coastal Sportsman. Monthly, single copy 5 cents. 2419 Ave. C, Beaumont, Texas.

Virginia Wildlife. Monthly, 25 cents a year. Blacksburg, Va.

Wisconsin Outdoors. Monthly, $1.00 a year, single copy 10 cents. Reedsburg, Wis.

The Wisconsin Sportsman. Monthly, $1.00 a year, single copy 10 cents. 2004 Winnebago St., Madison, Wis.

NOTES AND NEWS

The cooperative agreement between the Biological Survey and the Forest Service noted in WILDLIFE REVIEW, No. 3, April 1936, p. 15, has been revised, effective January 26, 1938, so as to specify in detail the responsibilities of the two bureaus. In general the allocation of duties affecting the wildlife program on the national forests may be described as research to the Biological Survey and management to the Forest Service.

Under a cooperative agreement between the University of Missouri, the Missouri Conservation Commission, and the Biological Survey, a new cooperative wildlife research unit was established at the University, at Columbia, on November 1, with Dr. Paul D. Dalke, formerly leader of the Connecticut Unit, in charge. Work at the Connecticut Unit will be continued under an arrangement whereby John Pearce, stationed at the Northeast Forest Experiment Station, New Haven, Conn., and Prof. A. E. Moss, head of the Department of Forestry, Connecticut State College, will look after the general program.

"The Natural Vegetation of Arizona" (Univ. of Arizona, Tucson, Tech. Bul. 68, pp. 181-282, 22 photos, 1 fig., July 1937), by A. A. Nichol, in addition to its expected content contains a good many notes on animals, some of them relating to food habits. A colored map of the principal plant associations of the State is a valuable feature.

"Wildlife Management in North Carolina," mimeographed in November and December 1937 and printed in January 1938, is devoted to the cooperative game management undertakings of the Zoology Department of the State College of Agriculture and Engineering and the Division of Game and Inland Fisheries of the State Department of Conservation and Development, at Raleigh. The contents of the January 1938 issue are indicated on page 26 of WILDLIFE REVIEW, No. 11, February 1938.

The Wisconsin Conservation Department, in view of the beneficial activities of most hawks, and the difficulties for laymen of identifying and selectively killing the injurious species, has suggested to County Clerks that no bounty be offered on any hawk. It is considered that the great horned owl is readily enough identified so that payment of a bounty on this species is sometimes justifiable. [Abstract of release dated February 2, 1938.]

The American Association for the Advancement of Science has issued a 12-page bibliography entitled "Conserving our Natural Resources". It cites author, publisher, title, pagination, and price, and briefly comments on leading recent works on the general subject of conservation and on such subdivisions as land use, forests, water, oil and gas, minerals, and wildlife. The names, addresses, and subscription rates of magazines devoted chiefly to conservation are given, as well as references to certain special conservation material that has appeared fairly recently in these and other periodicals. The bibliography was prepared by a committee consisting of: Dr. Joseph L. Wheeler (Chairman), Enoch Pratt Free Library of Baltimore; Dr. Edward W. Berry, Johns Hopkins University, Baltimore; Dr. Paul R. Heyl, Bureau of Standards, Washington, D.C.; Dr. Burton E. Livingston, Johns Hopkins University, Baltimore.

Copies of this bibliography may be obtained by applying to the Permanent Secretary of the Association, Smithsonian Institution Building, Washington, D.C.

"Knowing Your Trees" is a book in which accounts that have appeared in American Forests of 50 species of trees are reproduced. Each unit of the series includes descriptive matter covering the characteristics, and economic importance of the species, photographs of typical specimen, and of its bark, and other diagnostic details, and in addition a range map. The work is attractive in make-up, both inside and out; it may be obtained from The American Forestry Association, Washington, D. C.

Two bird books that readers of WILDLIFE REVIEW may wish to know about are among recent publications. "The Book of Birds" in two volumes, each of more than 350 pages and lavishly illustrated, assembles articles that have been published from time to time in The National Geographic Magazine. There are 204 color plates by Allan Brooks. The work may be obtained from the National Geographic Society, Washington, D. C., for $5.00 per set.

"Bird Studies at Old Cape May" embodies observations by its author, Witmer Stone, extending over a period of 48 years as well as recorded data on birds of the New Jersey and Delaware coasts. It comprises two volumes totalling more than 950 pages, and is also very fully and interestingly illustrated with photographs, 2 colored plates, 1 full page etching, and many line drawings of birds and landscapes, mostly contributed by friends of the author. These books are being handled by the Delaware Valley Ornithological Club, c/o Academy of Natural Sciences, Philadelphia, Pa.; price $6.00 for the two.

Wilderness News of which No. 6 was issued in October 1937 is a multilithed periodical devoted to the interests of the Wilderness Society. Those interested may address the Editor at 1840 Mintwood Place, Washington, D. C.

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AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
ISSUED FOR THE INFORMATION OF COOPERATORS
BY THE
BUREAU OF BIOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF AGRICULTURE

CLEMSON COLL. AGR. ENG. DEPT. OCT 21 1937

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Washington, D. C. No. 13 March, 1938

Control: Electric fence, value of

Gerstell, Richard. Electric fencing as a deer control agency, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(12), March 1938, pp. 8-9, 32, 2 photos, 2 line cuts.

A preliminary report on experiments with electric fencing in preventing damage by deer. Spacing of the wires thus far found most effective was for the lower, 22 inches above the ground and for the upper, 15 inches higher. The wires must be entirely insulated and this was economically accomplished by the use of old inner tubes. A very high percentage of the animals make contact by nosing the wire and as a rule avoided it thereafter. The fences were better than 90 percent efficient in preventing deer from entering the experimental plots. Results of tests with bear were contradictory. Caution in the use of electric fences is urged. They are no solution of overpopulation problems.

Cycles: Arctic animals

Chitty, Dennis, and Charles Elton. Canadian arctic wild life Enquiry 1935-36, Journ. Animal Ecology (Cambridge University Press, Fetter Lane, London, E. C. 4, England), 6(2), Nov. 1937, pp. 368-385, 4 figs., 3 tables.

Notes on cyclic fluctuations of arctic animals. Returns from a second questionnaire as to numbers and diseases of the arctic fox, lemming, snowy owl, ptarmigan, and sledge dog. Reports of increase or decrease are plotted on maps and the original data is presented also in tables. Part of the authors' summary is: "Arctic foxes showed almost universal decrease and scarcity. More than a third of the observers reported increase in lemmings: increase in snowy owls was also reported from some of the same points. The ptarmigan data are reserved for future publication. There were practically no reports of disease among sledge dogs in the Eastern Arctic, and only a few on the Western Arctic coast and islands. Disease was reported more frequently from the Great Slave Lake area and a few other points in the Mackenzie River Valley. These fluctuations are a vital factor in the economy of the Canadian Arctic, since they affect the fur trade, food supply, and dog transport. The enquiry is being continued."

Bibliography of 14 titles.

Cycles: Cottontail

Leopold, Aldo, and Harry G. Anderson. The 1936 cottontail scarcity in Wisconsin, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 19(1), February 1938, pp. 110-111.

Evidence is given that cottontails after a productive spring breeding season decreased during a hot and dry summer, the degree of reduction differing by regions of the State. The onset of the shortage was just 8 years after the last similar phenomenon. The fluctuation may be regarded as "the cycle" but to so label it adds nothing to our understanding of its nature.

Cycles: Hungarian partridge

Rowan, William. The Hungarian partridge on the Canadian prairies, Outdoor America (1167 Merchandise Mart, Chicago, Ill., 10 cents a copy), 3(4), Feb. 1938, pp. 6-7, 1 fig.

History of introduction and spread; the bird seems to be developing a population cycle coincident with that of rabbits and grouse.

Destruction: Desert bighorn

Nichol, A. A. Desert bighorn sheep, Arizona Wildlife Magazine (32 W. Jefferson St., Phoenix, Ariz., 25 cents a copy), 7(7), Nov.-Dec. 1937, pp. 9, 16, 1 photo; 7(8), Jan-Feb. 1938, pp. 3, 12, 1 photo.

The desert bighorn appears now to be at an all time low ebb in population. "The three major factors that at present are operating to the detriment of the species are poaching, roads, and drought, and the greatest of these is poaching." Amateur prospectors wantonly shoot the animals at watering places, often making no use whatever of the carcass. Roads bring in more people and so increase the killing of the sheep. Drought has operated inimically by forcing the animals into new areas and especially by making them dependent upon a reduced number of water holes where they are readily shot. [End of Part 1.]

Notes on feeds and their availability in dry periods. Dry years curtail breeding and, added to other inimical factors, retard recovery of numbers. Predation, while not a serious hazard under normal conditions, may be more important in relation to a depleted population. The presence of great herds of wild burros has favored increase in mountain lions which take toll also of the sheep. The burro herds should be extirpated and the lions reduced. Some predator control especially designed to aid the sheep may be required but the first necessity is to stop poaching. Author's recommendation: "Develop supplementary water, and stop water-hole hunting, and the sheep will again increase. This sounds a simple and cheerful statement. What needs to be done is simple, and it is fine and advantageous that it is so; but what is not cheerful is the so very important truth that if these remedies are not quickly administered, there will be left no desert Bighorn sheep to receive the treatment."

Destruction: Effects of insecticides

Swenk, Myron. Bird mortality in the 1936 Nebraska grasshopper poisoning campaign, Nebraska Bird Review (1410 North 37th St., Lincoln, Nebr.), 4, 1936, pp. 98-99.

Tabulation of reports from county agents, only 15 of which are of possible value as indicating poisoning. In 3 of the 15 counties represented by these reports "there was no loss except where bait had been improperly used regardless of the instructions given. In one a domestic pigeon was thought to have

been killed through feeding on bait, and in another several domestic geese were reported to have been similarly killed. Two instances of supposed poisoning of wild birds were reported from one county, a few cases each from two other counties, and several cases from a third county. A few dead birds were reported found in four counties, about a dozen in another county and an indefinite larger number in a sixth county. But in no case was it definitely shown that birds died of poisoning, and not of heat and thirst."

Diseases and Parasites: Ectoparasites in relation to bird diseases

Herman, Carlton M. Ectoparasites and bird diseases, Bird-Banding (Charles B. Floyd, 95 South St., Boston, Mass., 50 cents a copy), 7(4), Oct. 1936, pp. 163-166.

Diseases caused by Plasmodium, Haemoproteus, Leucocytozoon, Heptazoon, Pasteurella, etc., and their known or probable vectors. Direct injuries by Protocalliphora and mites with suggestions as to possibilities of control.

Diseases and Parasites: Hippoboscid flies

Herman, Carlton M. Notes on hippoboscid flies, Bird-Banding (Charles B. Floyd, 95 South St., Boston, Mass., 50 cents a copy), 8(4), Oct. 1937, pp. 161-166.

Four species collected on Cape Cod, Mass., with lists of their bird hosts, notes on abundance, role in carrying Mallophaga, and upon mites found on the flies.

Diseases and Parasites: Minnesota investigations

Green, R. G. et al. Minnesota Wildlife Disease Investigations (Department of Bacteriology, University of Minnesota, Minneapolis), Oct.-Nov. 1937, pp. 141-168, tables 78-99.

An article on Tick Parasites reviews the literature (5 titles cited), gives distribution in Minnesota, percentage of parasitism (average 7.4) attained, and numbers of the parasites (3-10) emerging from hosts. Summary of a report on The Occurrence of Shock Disease among Young Snowshoe Hares is: Shock disease as we have observed it, develops in areas highly populated by hares. The young are readily affected, succumbing at an average age of 6.5 weeks. Reports are given of autopsies on quail affected by blackhead, wild ducks, pheasants, and muskrats with various maladies, and on snowshoe hares collected in the Lake Alexander study area. Experimental pen and range studies with hares are analyzed. Improvements in census calculations are discussed mathematically and the conclusion drawn that all of the work so far has been free from significant error. A summary of population statistics of 1932-37 shows that the die-off does not appear suddenly and does not complete its destruction in a short time--even in a year. On the contrary, in the study area it proceeded at a fairly regular rate through a period of 5 years. The die-off may begin also on one area several years before an adjacent area is involved. There are brief articles on reproduction in snowshoe hares, and on the occurrence of lead poisoning in nature.

Diseases and Parasites: Persimmon wilt

Detwiler, S. B. The soil-saving persimmon, Soil Conservation (Supt. of Documents, Washington, D. C., 10 cents a copy), 3(8), Feb. 1938, pp. 230-231, 2 photos.

The value of the wood and fruit of the tree is estimated at 16 million dollars annually; there is also a large unestimated value in erosion control. The persimmon, widely utilized by wildlife, is now menaced by a deadly wilt disease. The present paper is one move and others are being taken to bring about proper investigation, and if possible control, of the disease.

Diseases and Parasites: Protocalliphora

Mason, Edwin A. Parasitism of birds' nests by Protocalliphora at Groton, Massachusetts, Bird-Banding (Charles B. Floyd, 95 South St., Boston, Mass., 50 cents a copy), 7(3), July 1936, pp. 112-121, 2 tables.

Notes on number of these dipterous parasites found in 24 nests in 1932 and summaries for the years 1932-35. Discussion of a few case histories, of the value of changing the nest as a means of getting rid of the parasites, and of favoring the population of chalcidid hyperparasites as a method of control. Conclusions are rather pessimistic, more so than seems warranted by observations of the abstracter on about the same complex in Maryland.

Ecology: Food supplies of pheasant appraised

Errington, Paul L. Quality of winter pheasant foods, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 25 cents a copy), 41(11), Nov. 1937, pp. 202-203.

Popular resume of his paper "Emergency values of some winter pheasant foods" abstracted in WILDLIFE REVIEW, No. 11, February 1938, pp. 33-34.

Ecology: Forests and wildlife

Deem, J. L. Forest practices affecting wildlife, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy) 8(12), March 1938, pp. 12-13, 1 photo.

A good brief discussion of forest wildlife relationships, telling what seems certainly known, what is questionable, and what should be found out.

Ecology: Populations

Bureau of Animal Population (Oxford University, England) Annual Report 1936-37, 38 pp., 1938.

Summary of world work of the year on animal populations. "The year under review has seen a general development of interest in animal population problems in many parts of the world, accompanied by useful technical discoveries, but without any very striking contribution of abstract ideas." Dis-

cussion of the relation of animal population phenomena to mankind. Statement of financial support, and list of the staff, of the Bureau. Recapitulation of its research work of the year on voles, rabbits, and hares, introduced mammals, partridges and other game birds, and ecological surveys, publications on which have mostly been abstracted in previous issues of WILDLIFE REVIEW. List of papers by members of the staff published during the year and comment on library facilities and work.

Ecology: Populations, brant in California

Moffitt, James. Seventh annual black brant census in California, Calif. Fish and Game (Ferry Bldg., San Francisco, Calif.), 23(4), Oct. 1937, pp. 290-295, 1 table.

About the same material as abstracted in WILDLIFE REVIEW, No. 11, February 1938, page 13; with notes on the 1936-37 flight, summary of the records, and the suggestion that before we can properly interpret numerical fluctuations of brant in the north, we will have to know a great deal more of the occurrence of the birds in Lower California.

Ecology: Populations, European partridge

Middleton, A. D. The population of partridges (Perdix perdix) in Great Britain during 1936, Journ. Animal Ecology (Cambridge University Press, Fetter Lane, London, E. C. 4, England), 6(2), Nov. 1937, pp. 318-321, 3 tables.

Continuation of reports already noticed in WILDLIFE REVIEW, No. 1, September 1935, page 12, No. 3, April 1936, page 13, and No. 8, April 1937, page 11. Density was high (up to 663 nests actually found on 3,000 acres) but due to unfavorable weather, brood survival was low. The kill in consequence was lower than in the preceding year. All of these things are recorded in detail in the tables.

Economics: Value of fur, Wisconsin

Anon. Million dollar trapping income, Wisconsin Conservation Bul. (State Dept. of Conservation, Madison), 3(2), Feb., 1938, p. 33.

Number of skins, average price, and total value of the catch of 17 groups of mammals for the 1936-37 season. The muskrat leads in numbers (362,371) and in aggregate value ($521,814), while otter and beaver brought the highest average prices, $15.62 and $13.86, respectively. Totals are: numbers 1,324,533, and value $1,080,348.

Education: Conservation through 4-H Clubs

Lohmann, Ruth. Teaching conservation of wildlife through 4-H Clubs, U. S. Dept. Agr. Miscellaneous Pub. (Supt. of Documents, Washington, D. C., 10 cents a copy) 291, 34 pp., 4 figs., 1938.

Present status of wildlife; need for conservation; opportunities for teaching conservation through 4-H Clubs; wildlife objectives of the Clubs; suggested conservation practices for the members; wildlife conservation in the 4-H program in 1934 and 1935; setting up a program; conservation as a project; means and agencies for use in teaching; typical programs for a year; community clubs; literature cited (15 titles); selected bibliographies relative to conservation, nature trail, birds, mammals, and other nature subjects.

Food Habits: European partridges

Middleton, A. D., and Helen Chitty. The food of adult partridges, Perdix perdix and Alectoris rufa in Great Britain, Journ. Animal Ecology (Cambridge University Press, Fetter Lane, London, E. C. 4, England), 6(2), Nov. 1937, pp. 322-336, pls. 9-10, 1 fig., 3 tables.

Analyses of crop contents only, the volumes of components of which were for the most part actually measured. Partridge habitat and seasonal changes in it are described; the environment for most of the birds collected was farming land with a great diversity of crops. The proportions of classes of food of the grey partridge (429 crops) by seasons are shown in table and graph. The leading items are grass, clover, and leaves, 42.2 percent; grain, 21.2; and grass and weed seeds, 20.8. Figures as to number, frequency, and bulk are given also for the species identified. Animal food, chiefly insects, constituting only 2.5 percent of the food of the year, is listed; ants are the most important element by bulk, about eight-tenths of the whole.

Results are given on a pen-feeding test as to the quantity of food consumed; the average, exclusive of grass and other leaves that may have been picked in the pen, for 66 bird-days was 23.7 grams. Data are presented on the food of 29 red-legged partridges; they reveal the important items as seeds 28.4 percent, roots 28.2, grain 27.3, and greens 16. Suggestions for management are given, particularly as to improvement of the winter food supply. Bibliography of 7 titles, 4 of them Usonian.

Food Habits: Pheasant

Severin, H. C. A summary of an economic study of the food of the ringneck pheasant in South Dakota, Proc. S. Dak. Acad. Sci. (University of South Dakota, Vermillion, S. Dak.), 16, 1936, pp. 44-58, tables.

This species, introduced into the State in 1912, so increased that a million birds have been harvested by gunners during each hunting season since 1927. The large population brought the economic status of the pheasant to public attention and an investigation was made to throw light on contending claims. Analysis of the contents of 285 crops and gizzards is reported by a numerical system. Seeds taken averaged 492 per bird and of the total 25.7% were reckoned as useful to man, 34.8% neutral, and 39% harmful. Corn, the most important single food, is eaten at all seasons but much of it is waste. Serious damage to the corn crop was not observed. The animal food of the birds was 97% insects by number. On the same basis, 40% of the food items of animal origin were classed as harmful to man, 3% useful, and 30% doubtful. Fly

larvae, cutworms, and beetles were prominent, while grasshoppers were taken less frequently than expected. The pheasant probably does as much good as harm through its feeding habits in South Dakota.

This paper is a digest of an extensive report not publicized at the time of issue for the reason that it was published in a strictly limited edition; copies were deposited, however, in numerous libraries. That paper entitled, "An economic study of the food of the ring-necked pheasant in South Dakota," was issued in mimeographed form in 1933. It comprised 252 pages, including numerous figures and tables, and besides general discussion, presents detailed analyses of the crop and gizzard contents of 504 pheasants.

Food Habits: Ruffed grouse

Gross, Alfred O. Food of the ruffed grouse, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 25 cents a copy), 41(8), Aug. 1937, pp. 142-144, 2 figs., 2 tables.

Summary of results of analyses by the Biological Survey of 1,055 crop and stomach contents collected in connection with the New England Ruffed Grouse Investigation. The tables give the frequency of occurrence and average percentage by bulk of long lists of vegetable and animal food items. The more important foods of the first class according to volume were derived from oak (chiefly acorns), thorn apple, apple, Maianthemum, blackberry, and poplar; and in the second, from grasshoppers. Vegetable matter constituted 98.57 percent of the total food.

Food Habits: Sea otter

Williams, Cecil S. Notes on food of the sea otter, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 19(1), Feb. 1938, pp. 105-107, 2 tables.

Two thousand probably a liberal estimate of the existing North American sea otter population. The animals frequent isolated kelp beds. From study of droppings the important foods were found to be sea urchins and mollusks. Other food items and incidental objects are mentioned, and the results of the investigation compared with those of a study made in the Commander Islands.

Introductions: Gray squirrel, Great Britain

Parsons, B. T., and A. D. Middleton. The distribution of the grey squirrel (Sciurus carolinensis) in Great Britain in 1937, Journ. Animal Ecology (Cambridge University Press, Fetter Lane, London, E. C. 4, England) 6(2), Nov. 1937, pp. 286-290, 1 map, 3 tables.

The range of the animal continues to increase. Figures are given for the annual kill on 4 estates from 1932 to 1937; the largest record for each is 450, 1,059, 1,427, 1,125, 936.

Life Histories: Black-tailed deer

Orr, Robert T. Notes on the deer of California Redwood State Park, Calif. Fish and Game (Ferry Bldg., San Francisco, Calif.), 23(4), Oct. 1937, pp. 286-289; figs. 79-80 (photos).

This area of about 10,000 acres has a minimum population of black-tailed deer of one to 40 acres. Important foods are canyon oak, California lilac, buckbrush, salal, huckleberry, madrone, and grasses. Eighty percent of the does bear young, twins in from 20 to 30 percent of the cases. Competition between deer and raccoons. Notes on good and bad effects of artificial feeding.

Life Histories: Blue-winged teal

Bennett, Logan J. The blue-winged teal, its ecology and management, xiv+144 pp., 1 col. pl., 19 vignettes, 31 photos, 6 maps, 33 tables, 1938 (Collegiate Press, Inc., State College, Ames, Iowa, $1.50 a copy).

An attractive and well-made book embodying results from the author's survey of the literature (71 titles cited) and from field work extending from 1932 to 1937. In earlier stages, the work was an Iowa cooperative undertaking; later it became the main project of the Federal-State cooperative unit for Iowa. The field work while done mainly in that State was extended in a less intensive way to the northern great plains region and to Mexico. The publication of so much original observation is a distinct contribution to a great need of wildlife management, namely for definitive life histories; every one adequately done constitutes a permanent advance in the field.

It is impossible to present in this abstract the essence of the book, witness Bennett's summary with 84 paragraphs. Suffice it to say that the biology and ecology of the bird are covered very comprehensively. Chapter headings indicating this fact are: Characteristics of the bird, Breeding range, Fall migration, Wintering grounds, Spring migration, Courtship and mating, Nesting, Rearing of young, Nest destruction and juvenile mortality, Nesting cover, Rearing cover, Food habits, Nesting populations, Parasites and disease, Agriculture and drainage, Breeding, refuge, and shooting areas, Estimating the yearly production, Future of the blue-winged teal.

Points of theoretical interest: Conflicts with coots harmless and apparently settling no question; there were no territorial disputes by either males or females; motherless young assimilated into other broods without any difficulty.

The book is a bargain at $1.50 as publication was subsidized to the extent of a third of the total cost.

Life Histories: Mountain sheep, Yellowstone Park

Davis, William B. Summer activity of mountain sheep on Mt. Washburn, Yellowstone National Park, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 19(1), Feb. 1938, pp. 88-94, 3 tables.

Information on daily activity, beds, voice, food, chewing the cud, molt, parasites, home range, and fate of lambs. Measured by time spent in grazing on them, grasses, Pedicularis, and Phacelia were the most important foods in July. Daily cruising radius as much as 1 or 1-1/2 miles; average 3/4 mile. Mortality of lambs, mostly occurring during the first winter, exceeds 50 percent; no predators were seen.

Life Histories: Wolf

Olson, Sigurd F. Organization and range of the pack, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.25 a copy), 19(1), Jan. 1938, pp. 168-170, 2 figs.

Wolf packs in northeastern Minnesota vary in number from 5 to 30 individuals. The packs range over well established circuits that may be from 30 to 50 miles in diameter and up to several hundred miles in total length.

Life Histories: Wood rat

Vestal, Elden H. Biotic relations of the wood rat (Neotoma fuscipes) in the Berkeley Hills, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 19(1), Feb. 1938, pp. 1-36, 4 figs., 3 tables.

Description of habitat and account of observations under numerous headings of which those relating to scatology, houses, breeding habits, food habits, enemies, and parasites probably are of most immediate interest to the wildlife manager. A list of 25 species of plant foods is given. Part of the author's summary is:

"An average of 20.7 adults per acre was found at the beginning of the breeding season in one favorable area of about 25 acres. The breeding season coincides roughly with the period of maximum plant growth in the habitat. It begins about March 4 and most young are born in early April, although some are born as late as the latter half of August. One litter per season is the rule. Average and extreme numbers of young in 18 litters were 2.6 (1-4). Wood rats appear to be polygamous. Foods eaten by the wood rat include herbage and fruits of trees, shrubs, bushes, herbs, and grasses. A daily supply of green food enables wood rats to dispense with free water. They store green food each day within reach of the nest. In autumn they store also nuts, acorns, seeds, and berries, which are used in winter. Wood rats do not hibernate. The forage range of a wood rat averages less than 100 feet in radius from the nest. In some places, where numerous, the animals damage trees by over-pruning. Enemies of wood rats are: bobcats, horned owls, men, weasels, barn owls, and dogs, important in the order named. Wood rats are externally parasitized by fleas, cone-noses, bot-warbles, ear mites, and ticks. Human activities of clearing and burning of underbrush and trimming out of trees eliminate wood rats. As a result of the killing of many bobcats in Wildcat Canyon the wood rats have increased there."

Management: Bobwhite

Stoddard, Herbert L. Sixth Annual Report Cooperative Quail Study Association (Thomasville, Ga.), 1936-37, 27 pp., 1938.

General statement of the work of the Association including that done in cooperation, with lists of cooperators and visitors to headquarters. Comment is made upon numerous subjects including, as in previous reports, the use of fire; attention is drawn to danger to the Association's program in the legislative proposals of fire exclusionists. The relation to game preserves of the paper industry now rapidly developing in the Southeast is discussed; "the trend will probably be in favor of deer and adverse to quail on the acreages owned for paper pulp production." Experiments with various plants of promise in wildlife management, their cultivation, and fertilization are reported upon. There is a section on trial of electric fence and another on reclaiming pastured lands for quail. Progress in the mammal studies of E. V. Komarek and of the fire ant investigations by Bernard V. Travis of the U. S. Bureau of Entomology and Plant Quarantine also is summarized.

Management: Bobwhite, Missouri

Terrill, Harold V. Requirements for quail in Missouri, State Conservation Commission (Jefferson City, Mo.), 6 pp., 2 maps, mimeographed, 1938.

The more important needs as to cover, food, and water, and suggestions as to how they may be met on the farm. Accompanying explanatory text are maps illustrating a farm unsuitable for quail and changes that can be made to improve it. The whole release is cast in the form of a letter to cooperators.

Management: Bobwhite, value of refuges

Claycomb, G. B. A solution for the quail problem, Louisiana Conservation Review (State Dept. of Conservation, 126 Civil Courts Bldg., New Orleans, La.), Winter 1937-8, pp. 43-44.

Alarming decline in the quail population has resulted from intensive cultivation, erosion, and depredations of roaming cats and dogs, but "unrestricted hunting has been the greatest evil." Hunting must be better regulated and one way of doing this is establishment of Protection Areas where the birds are not merely protected but also fed. The author cites the increase of quail on a refuge he has kept for 3 years and points out that "Such tracts have been maintained in a way by farmers who have posted their land. These farmers have been cursed and maligned by hunters in general, while as a matter of fact they have incidentally been about the best friends that hunting has ever had. Upon these posted lands the quail have been able to maintain themselves and serve as a supply reservoir for the surrounding lands. We need a considerable part of our land in Protection Areas. If half of our land were so protected, hunting would be twice as good on the remaining half." Noting that the cost of propagated quail is a dollar or more per bird, the author goes on to say that "The rearing of hatchery raised Quail during the summer to be shot by hunters in the fall cannot be economically justified. The only

legitimate reason for rearing Quail artificially is that they may become potential breeders when released. Now the logical place for the release of these hatchery reared Quail is upon the already established Protection Areas where they will find conditions suitable for their breeding activities."

Management: Farm game

Tubbs, Farley. Farm crops versus game, Michigan Conservation (State Dept. of Conservation, State Office Bldg., Lansing, Mich.), 7(6), Feb. 1938, pp. 6-7, 3 photos.

Intensive and exploitive farming are both injurious to wildlife; areas subjected to the former practice can best be improved by restoration of cover and to the latter by renewal of fertility. The value of prompt and regular manure spreading, of fertilization and rotation of pastures, and of preserving ground cover in wood lots is emphasized.

Management: Farmer-sportsman relationship

McCachran, R. A. The farm-game refuge program wins, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 8(12), March 1938, pp. 4-5, 29, 2 photos.

Summation by 17 topics of answers to a questionnaire directed to both farmers and sportsmen that constitutes an overwhelming indorsement of the plan to date. Information on acre-costs of 5 phases of the projects also is included.

Management: Forest wildlife

Bode, I. T. The extension forester and wildlife conservation, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 36(3), March 1938, pp. 283-287.

Analysis of the job of an extension biologist as applied to forestry. The wide and deep public interest in wildlife indicatesthat it is an essential land resource, the demand for which is increasing, and apparently never will be over-supplied. In extension work under present conditions the writer believes that logical approach to the educational program involves: "(a) The placing of primary emphasis at this time on the esthetic, recreational, social, and indirect economical values; (b) Approaching primary or directly economical values, for the time being, on the basis of trial and careful procedure; avoiding premature promises of primary economic returns and possibilities; (c) Planning all approach on the basis of integration with other land use practices, acknowledging the wildlife resource as only a part of the entire picture of land use."

Wildlife utilization is an integral part of land use. There must be a harmonizing of views of the holders of land on which wildlife is produced and of the people who want to use this resource. A step toward this end is the incorporation of wildlife planning in farming, pasturing, forestry, erosion

control, and other land use activities. Forests do not automatically and inevitably produce a satisfactory wildlife crop; they must be managed to that end. There are barren areas not suited to production of tree crops that can well be devoted to wildlife. Woodland margins do not produce the best timber trees but they are excellent for, and may well be allocated to, wildlife--an objective that may be effected in part by sparing them from stand improvement treatment. Some nut and den trees can be left in the forest with very little damage to the ultimate product. Research is needed as to the best combination uses of forest lands.

Management: Forest wildlife

Shantz, H. L. Recent developments in wildlife management, Journ. Forestry (Mills Bldg., Washington,D. C., 50 cents a copy), 36(2), Feb. 1938, pp. 149-151.

"The physical environment, the biological inter-relationships, the social and economic interests, divided legal authority, and the conflict of various interests" make the management of wildlife on national forests a very complicated problem. About a fourth of this paper is devoted to fish management. Beyond that, overpopulations of ruminants and the possibilities controlling them are the principal subjects discussed, although there is some reference to beavers, waterfowl, upland game birds, and rare species.

Management: Harvesting coon and possum, Illinois

Mohr, Carl O. Illinois trappers' averages reveal coon and possum distribution, Illinois Conservation (State Dept. of Conservation, Springfield, Ill.), 2(4), Fall 1937, pp. 3-4, 8, 1 fig., 3 maps.

The average catch in the most favored counties was 4 coons and 16 possums per trapper. Distribution of the catch is mapped and discussed. Recommendations for better protection of coons, including preservation of den trees.

Management: Harvesting squirrels

Chapman, Floyd B. Controlled squirrel hunting on Ohio hunting preserves, 1937, Ohio Wildlife Research Station (Ohio State University, Columbus, Ohio), Release 68, 8 pp., 10 tables, mimeographed, Jan. 1938.

Reports for previous years were abstracted in WILDLIFE REVIEW, No. 4, June 1936, page 15, No. 5, Sept. 1936, page 19, and No. 9, July 1937, pages 26-27. There is a definition of classes, and a list, of State refuges and sanctuaries, showing type, location and acreage. The gray squirrel population appears to be cyclic, the low being reached in 1937 in most of southern Ohio. The harvest by hunters is tabulated in various ways and compared with that of 1935 and 1936. Hunting pressure has been proportional to publicity and the conclusion is drawn that "regulated publicity can be used to attract approximately the number of hunters required to harvest a given surplus."

Out of 324 hunters, 257 got no squirrels, and on the average hunters spent 11.6 hours in the field for each squirrel bagged. [Scarcity evidently protects the animals but under discretionary regulation of open seasons, it would seem that no shooting should be allowed during the low of a cycle.] Statistics are given for weights by age classes and sexes, and on sex ratio. This has varied through the years from 39.3 to 60.0 percent males, but the variation has not been correlated numerically with either the total population or the take. The physical condition of the squirrels and the prevalence of parasites in them are reported upon. Food items identified were hickory nuts, acorns, and dogwood berries. Pelage changes are described.

Management: Harvesting whales

Hjort, Johan. The story of whaling, Scientific Monthly (Lancaster, Pa., 50 cents a copy), July 1937, pp. 19-34, 14 figs. (photos), 2 graphs.

The first satisfactory grouping of whales was based on their food habits. The Danish scientist Eschricht in 1846 distinguished four biological groups, namely, "those which lived on fish, on warm-blooded animals, on crustacea of many kinds and sizes, and lastly on cuttlefish." Details are given including the scientific names of these food items and the influence their occurrence and abundance has upon the movements of whales. The history of whaling is briefed according to stages in technique. In each there was "the same course of events: a rapid expansion x x x from a starting point to the whole area of distribution of the species and then a rather rapid decline or cessation of the specific whaling activities." Nowhere has whaling succeeded in maintaining a stable industry. The Norwegian whalers have taken some steps toward regulation but international action has been difficult to obtain. See WILDLIFE REVIEW, No. 10, October 1937, page 30, as to a treaty indicative of an improvement in the international situation. The article contains much of interest about whales and is well illustrated.

Management: Miscellaneous

Anon. Wildlife management in North Carolina (Division of Game and Inland Fisheries, Raleigh, N. C.), 15 pp., 3 figs. (photos), Feb. 1938.

Discussion of environmental improvement versus restocking as means of maintaining quail populations; value of poke seeds as quail food; use of lespedezas for gully control and wildlife conservation; maintaining cover by trimming ditch banks one side at a time in alternate years; shrubs for wildlife and farmstead beautification; and the stray cat problem.

Management: Planting for quail, Virginia

Handley, Charles O. Winter and the bobwhite, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 27(1), Jan.-Feb. 1938, p. 25.

"A well-fed quail fears neither subzero nor natural enemies." Comment on natural foods and feed patch plants valuable in Virginia.

Management: Planting for wildlife

Leffelman, L. J. Better land use for the piedmont, U. S. Dept. Agr. Land Policy Circular (Bureau of Agricultural Economics, Washington, D. C.), Feb. 1938, pp. 12-15, mimeographed.

Account of the Clemson College land utilization project on a 23,000 acre tract no longer suitable for arable farming. There is a section on wildlife restoration from which the following is quoted: "Planting of game feed and cover crops plays a part in the erosion control work undertaken on the project. Strip plantings of feed crops include lespedeza, peas, sagrain, hegari, sesbania, sumac, beggarweed, and millet. These feed supplies have doubtless contributed to the increase in quail already noted. Where one bird to every 52 acres was counted two years ago, there are five birds now."

Management: Range

Talbot, M. W. Indicators of southwestern range conditions, U. S. Dept. Agr. Farmers' Bul. (Supt. of Documents, Washington, D. C., 10 cents a copy), 1782, 34 pp., 36 figs. (photos), Dec. 1937 (1938).

This bulletin contains only a brief paragraph on range-destroying rodents and one other incidental mention of wildlife, but reference to it may be helpful to wildlife managers whose duties include range appraisal. Sample headings indicating the contents are: Signs of a deteriorating range, Why ranges deteriorate, Indications of satisfactory use, Key areas, and Tips on estimating grazing capacity.

Management: Waterfowl in California

Linsdale, Jean M. Observations on waterbirds in California, Calif. Fish and Game (Ferry Bldg., San Francisco, Calif., 25 cents a copy), 24(1), Jan. 1938, pp. 1-43, 9 photos, 5 tables.

Report on a study mainly confined to the central valley of California, ecological conditions in which are discussed with special reference to their bearing on waterfowl. Shooting grounds, commercial, private, and public, and refuges, State and Federal, are described in their relation to wild fowl. In general the water birds of California have greatly decreased in number; the present status of 26 species is indicated. Shooting practices, protective regulations, relation of water birds to agriculture, and the diseases of waterfowl also are briefly treated. There is a bibliography of 14 titles. The author's summary is here quoted in full.

"Availability of water is an acute problem for certain birds in California just as it is for people. Moreover, the aquatic habitat is remarkably complex, and it must be studied from many angles if it is to be maintained for adequate use by wild animals. The present study was undertaken to determine what areas are available for waterbirds and to study the effects of shooting practices. It seems that permanent solution of waterfowl problems

in California will require management of all the aquatic animals in order to satisfy all man's recreational needs and not alone his desire to shoot. The main problem regarding waterbirds seems to be what to do about restoration of numbers sufficient to preserve the species which have been so far depleted as to be in danger of extinction; it is not simply to provide birds of any sort to be killed.

"The former extensive marshy areas in the central part of the State were so reduced by 1936 that by the time the wintering birds arrived there was no water available except where the ground had been flooded for the birds. These places were mainly shooting grounds and refuges. Refuges are likely to be the most important devices for permanent preservation of waterbirds in California. They serve as sanctuary, as nesting places, as resting places, and as feeding places. A satisfactory refuge program would permit no grazing, no harvesting and no burning. It would be desirable to delay sedimentation in ponds as long as possible and to keep them filled with water as continuously as possible.

"Examination of several of the refuges already established revealed qualities especially suited to the birds and showed the nature of some possible improvements. More refuges need to be established if the State expects to have more wintering waterbirds.

"The total number of waterfowl shooters is not exactly known, but hunting stamp sales might indicate that around 40,000 persons shoot at these birds each season in California. Apparently this is too great a number to allow continued existence of all the kinds of waterbirds. It is probable that more drastic regulations of shooting will be necessary than any in force in past years. Moreover, it seems certain that neither improvement of habitat nor stricter regulation of shooting, even prohibition of it, would solve the waterfowl problem satisfactorily. The final solution must be some combination of these. Also we must accept the general condition which makes it impossible not to have anywhere nearly as many waterfowl in California as were present when the country was settled by the white man."

Pollution problems in California

Shaw, Paul A., and C. L. Towers. Water pollution problems in California, Calif. Fish and Game (Ferry Bldg., San Francisco, Calif., 25 cents a copy), 23(4), Oct. 1937, pp. 262-285, figs. 45-75 (mostly photos).

If this article had been available, the abstract in WILDLIFE REVIEW, No. 11, February 1938, page 31, would not have been prepared. The present reference is to the unabridged report, which with its information and copious illustration, makes an impressive showing as to the evils of pollution in California. Laws and regulations and the methods of enforcing them, and protective devices are treated. The menace of oil, especially oil sumps, to birds is depicted in text and photographs.

Predation

Lloyd, Hoyes. Predators help save game, Michigan Conservation (State Dept. of Conservation, State Office Bldg., Lansing, Mich.), 7(5), Jan. 1938, pp. 6-7, 2 photos.

Predation is normal, not exceptional, and when man disturbs the normal relationships between animals, he starts a chain of events the results of which cannot be foretold. Instances of deterioration of big game populations due to freedom from predation. Results of indiscriminate killing of hawks. "Except for direct defense of domestic stock, the attitude of the public towards predators is based generally upon prejudice and lack of knowledge, and it is the duty of those who have studied the problem, even though they have not fathomed all its intricacies, to give to the public the benefit of the knowledge gained in the hope that a saner and more philosophical view will be accepted as more is learned of the facts presented by the biologists who are wrestling with the problem."

Propagation: Brooders and rearing pens for game birds

Bade, August. Sportsmen build your own brooders, California Conservationist (State Dept. of Natural Resources, Sacramento, Calif., 15 cents a copy), 3(2), Feb. 1938, pp. 6-9, 4 photos, figs.

"The capacity of a game bird brooder should not be determined by the size of the hover, but by the amount of run, or exercise space" which should be a square foot per bird. A temperature of 95° directly under the heating element is quite sufficient. Description of brooder and run, and of rearing pens, as well as plans for their construction. Suggestions as to the general care and feeding of the growing birds. As the birds develop they need more room and cannot be crowded without bad results. "Generally speaking, young pheasants and partridges require 30 square feet of ground space, and matured birds, 50 square feet. Quail can get along on about 20 square feet. In all cases, however, the more elbow room the birds have the better they get along."

Propagation: Irradiation results, bobwhite

Bissonnette, Thomas H., and Albert G. Csech. Night lighting with bob-white, Bird-Banding (Charles B. Floyd, 95 South St., Boston, Mass., 50 cents a copy), 7(4), Oct. 1936, pp. 168-170.

Author's summary: "Increasing the daily period of exposure to light between December 16th and June 19th up to five hours per night with electric light from a 60-watt bulb induced a pair of Quail to begin to lay fertile hatchable eggs from March 22d onward. Controls began to lay at the usual time on May 19th. Total egg production was not increased as it was with Pheasants, but the hen died prematurely on June 19th. This method may be used to obtain early chicks from Quail for restocking depleted game preserves."

Propagation: Irradiation results, pheasant

Bissonnette, Thomas H. Fertile eggs from pheasants in January by "night-lighting," Bird-Banding (Charles B. Floyd, 95 South St., Boston, Mass., 50 cents a copy), 7(3), July 1936, pp. 108-111.

Report in greater detail of the material noted in WILDLIFE REVIEW, No. 4, June 1936, page 19. Review of literature and ample bibliography. Part of author's summary: "(1) A method is described by which it has been possible to induce Pheasants to begin laying between January 15th and 25th, so that young birds may be hatched early enough to allow them to develop mature plumage well in advance of the opening of the season for legal shooting of these birds in Connecticut. (2) The fertility of the eggs laid under these conditions was satisfactory, and hatchability was good in those set under hens."

Propagation: Ruffed grouse

Elmore, L. J. Fertility of ruffed grouse, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 25 cents a copy), 41(9), Sept. 1937, pp. 160, 168, 1 table; and 41(10), Oct. 1937, pp. 176, 185-186, 1 chart, 1 table.

The sexual cycle and behavior characteristic of its phases are described tests of the reactions of males to a mounted bird were made to determine what stage they had reached in the cycle. Indications of readiness to mate were borne out by good fertility of eggs upon actual pairing. Older cocks gave better fertility than yearlings, and those hatched from wild eggs were superior to cocks hatched from eggs laid in captivity. Activity in sexual display does not seem to be correlated with fertility, but mating is preceded by a test of dominance. Change in phase of the sexual cycle of the cock may occur even in the constant presence of females. Fertile egg production was as good or better in polygamous (1 to 6) as in monogamous matings.

Propagation: Wild turkey standards

Randall, Willet. Results of my wild turkey survey, Game Breeder and Sportsman (205 E. 42nd St., New York, N. Y., 25 cents a copy), 41(10), Oct. 1937, pp. 174-175, 184, 2 photos.

In praise of the turkeys of lowland South Carolina; discussion of their habits and "points" under the heading of color, wings, legs, and nest.

Research: Live shipment of small mammals

Blossom, Philip M. A screen wire container for the shipment of live small mammals, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 19(1), Feb. 1938, pp. 85-88, 2 figs.

A home-made container for packing in a carton; construction and use.

Research: Live trapping and shipment of voles

Chitty, Dennis. Live trapping and transport of voles in Great Britain, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 19(1), Feb. 1938, pp. 65-70, 2 figs.

Review of previous work, and account of British experience in devising traps and shipping cages that can be used with minimum losses of the animals. Figures give plans for the trap. Bibliography of 6 titles.

Research: Trapping birds of prey

Imler, Ralph H. Methods of taking birds of prey for banding, Bird-Banding (Charles B. Floyd, 95 South St., Boston, Mass., 50 cents a copy), 8(4), Oct. 1937, pp. 156-161, 2 photos.

Modifications of steel or jump traps and of method of attaching them to poles so as to prevent injury to birds getting in them. Suggestions as to the use of live and dead bait. Experience in use of traps and discussion of further improvements.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-103. Facts about snakes, 9 pp., February 1938.

The suggestions as to snake-proofing buildings and as to eradicating snakes by the use of poisonous gases and other means may be of interest to wildlife managers. Other topics treated are snake myths, and general habits and economic value of the animals.

BS-104. The status of wildlife research: 1937, by W. L. McAtee, 30 pp., February 1938.

Summary of research projects by Federal, State, and other agencies including the number of projects and synopsis of them according to subjects.

BS-105. The Federal aid to wildlife restoration act, by Albert M. Day, 4 pp., February 1938.

Fundamental provisions of the act which obviously is directed toward restoration of natural environment. Explanation of appropriations authorized. Functions of the Biological Survey in administering the law. Kind of projects likely to receive approval. Responsibility of the States for maintenance. Prospective benefits.

SPECIAL ARTICLE

Wildlife research programs

Some of the statements about wildlife research used in the preparation of Leaflet BS-104 (The status of wildlife research: 1937, 30 pp., 1938) are of such an interesting or representative nature that they may well be reproduced in full. Because the programs of the Federal-State cooperative units receive publicity in other media, reports on them are not included here. Again for reasons previously stated (WILDLIFE REVIEW, No. 6, November 1936, p. 2), fisheries investigations are not described. Aside from these stipulations, selection has been guided chiefly by illustrative value of the statements and it is hoped will be deemed in no way invidious.

The accounts are presented in the same order that their summaries appeared in Leaflet BS-104, and under similar headings.

RESEARCH BY THE BIOLOGICAL SURVEY AND COOPERATORS

Other State Institutions

Minnesota.-"The Minnesota Wildlife Disease Investigation, a cooperative project of the University of Minnesota, the Minnesota State Department of Conservation, and the Bureau of Biological Survey, maintained at the University of Minnesota under the direction of Dr. Robert G. Green, is this year completing a ten-year study of diseases of small game birds and mammals. In this study particular attention has been given to disease in relation to the decimation of "cyclic" species, ticks in relation to disease, the prevention of lead poisoning in waterfowl, and diseases of fur-bearing animals.

"Ticks and tick-borne diseases have not proved to be of great importance in cyclic variations of different species. Heavy infestations of ticks have a disastrous effect upon young animals but do not affect adults to a great extent. Tularemia plays a considerable part in deaths of cottontail rabbits but in grouse and snowshoe hares finds relatively resistant hosts. Rabbit papillomatosis has been found to be experimentally transmissible by the rabbit tick.

"The disease which is responsible for the periodic die-off of snowshoe hares has been recognized by its effect in reducing blood sugar to fatal levels and has been called shock disease. This discovery would seem to be the major accomplishment of the Investigation.

"The presence of such diseases as pseudotuberculosis, ulcerative enteritis, bird malaria, tuberculosis, rabbit papillomatosis, a malaria-like disease caused by leucocytozoa, an apparently new infectious disease caused by a diphtheroid bacterium, and botulism, have been studied among various species of animals and birds. Attention has been given to both ecto- and endo-parasitic infestations of different host species in relation to other mortality factors. The discovery and study of a well established colony of tick parasites in Minnesota are also worthy of mention.

"A lead-magnesium alloy shot has been developed which disintegrates in water and which, if ingested, is nontoxic for ducks. It is certain that, if this shot alone were used for duck shooting, the present disastrous epizootics of lead poisoning would eventually be alleviated and finally disappear.

"It is planned to continue the investigation with the intention of applying and practising the methods which have been discovered and developed. In the new ten-year program special attention will be given to the problem of the grouse cycle and to the etiology of shock disease." (Robert G. Green, Medical School, University of Minnesota, Sept. 20, 1937.)

RESEARCH BY FEDERAL BUREAUS OTHER THAN THE BIOLOGICAL SURVEY

Department of Agriculture

Bureau of Animal Industry.--"For more than 40 years the Bureau of Animal Industry has been accumulating information on the parasites of wild animals, including birds, in order to determine, among other things, what parasites of wildlife might be transmitted to livestock and poultry. As a result of this activity one of the largest parasite collections to be found anywhere in the world has been built up in the Zoological Division of that Bureau. This Division maintains also a catalogue of the world's literature on parasitology, one of the sections being devoted to parasites reported from various wild animals. Since the creation of the Zoological Division several hundred papers and notes dealing with the parasites of wildlife have been published, about 200 of these appearing during the past 10 years. These papers cover taxonomic investigations, descriptions of new species, distribution records, as well as life history investigations, particularly of those species parasitic in ruminants and in such important game birds as grouse and quail.

"During the past several years special interest has been centered around the general subject of the interrelationship of parasites of wild and domestic animals. As a result of this investigation, it appears that many of the parasites of ruminants, including such important forms as stomach worms, small intestinal trichostrongyles, lungworms, liver flukes, and rumen flukes, which are common and occasion extensive losses in livestock, occur also in deer, elk, moose, bison, and related wild animals. Exact information as to the losses among wild ruminants resulting from infestations with these parasites is for the most part lacking. In such cases as have been adequately investigated, however, it appears that parasites may and do cause extensive loss whenever conditions are favorable for their propagation. It has been shown also that wild waterfowl as well as upland game birds harbor parasites that are transmissible to domestic fowl.

"Whether or not wild mammals and birds, particularly those closely related to domestic species, obtained their parasite burden from domestic forms or vice versa is a debatable point and one for which evidence on either side is notably lacking. In the case of several parasites, particularly the large American liver fluke, Fascioloides magna, and of several species of small intestinal trichostrongyles of wild ruminants, the available evidence indicates that these forms are normal parasites of those animals and have

been transmitted to domestic ruminants. On the other hand there are some species parasitic in wild ruminants which were apparently acquired from their domestic relatives." (J. R. Mohler, Chief of Bureau, Sept. 25, 1937.)

Bureau of Entomology and Plant Quarantine.--"Recognizing the need for exerting every effort to conserve the fast diminishing numbers of valuable wild birds and mammals, the Bureau of Entomology and Plant Quarantine has for a number of years carried on studies incidental to other projects to determine the role of insect parasites in depleting our wildlife resources.

"For the past quarter of a century scientists of the Bureau have given consideration to the study of mites, lice, fleas, ticks, screwworms, and other arthropod parasites which often inflict heavy losses, either by their direct attack or by the transmission of disease, among wild animals. A great deal of information has been accumulated relative to the species involved, their life histories, distribution, and habits, and these data will eventually provide a substantial basis for the development of feasible control measures when the importance of conserving the wild fauna of this country receives the recognition it so rightly deserves. Cooperation is desired of bird lovers, sportsmen, and others in the collection of specimens of insect enemies of wildlife and information on deleterious effects of these pests.

"Another problem to which the Bureau is giving particular attention at this time is the destruction of quail in some of the southern States by fire ants. In some seasons these insects have been known to kill about 15% of the chicks before they leave the nest. Even the most effective control measures, intensively applied, have failed to reduce the mortality caused by these insect pests below about 5%. Investigations are under way to develop more efficient and practical methods for the control of the ants, and although some progress has been made, the situation is one which will require the best the entomologist and biologist have to offer.

"The interest of entomologists in the preservation of wildlife is well illustrated in their work on mosquito larvicides. Finding that the use of heavy oil as a means of destroying mosquito larvae in many instances was injurious to various species of aquatic animals and some of their plant foods, Federal and State investigators set about developing a material which was equally as effective in mosquito control as oil but which did not possess its objectionable qualities. As a result of this work, pyrethrum larvicide which is harmless to plants or animals was discovered. Further work of this nature involving the relation of insect control to wildlife is being carried on.

"During the past few years there has developed an increased interest in and urgent necessity for the control of disease-carrying and pestiferous mosquitoes near centers of large populations, resorting places, and even in rural districts. Mosquitoes breed in enormous numbers in salt marshes, ponds, and swampy areas. These places are also often the principal nesting, feeding and resting grounds for economically important waterfowl and fur-bearing animals. In an effort to free communities from annoyance and the health-hazard of mosquitoes, Federal, State, and local agencies have taken extensive steps to eliminate these mosquito-breeding areas by ditching, the most prac-

tical method of accomplishing this end. Unfortunately, such operations have in some instances seriously disturbed the favorite natural habitats of wildlife and may eventually prove distinctly deleterious to it.

"The Bureau of Entomology and Plant Quarantine, in cooperation with the Bureau of Biological Survey, is studying the important subject of mosquito-control in order to determine methods of effectively destroying these pests and at the same time cause little or no disturbance of natural wildlife conditions.

"The control of mosquitoes and the conservation of wildlife are important problems and the close relationship between the two demands full support and cooperation of the exponents of both if the former is to be satisfactorily solved and the best interests of wildlife preservation served.

"Widespread fall and winter burning of bunch grass, uncultivated areas, and edges of woodlands was formerly recommended for the control of chinch bugs. One of the reasons this recommendation is no longer made is the fact that the practice resulted in extensive destruction of game cover and nesting sites, and of the food of small game animals and beneficial birds. Another reason for discontinuing the recommendation of burning for the control of chinch bugs was the tendency of the farmers to apply it indiscriminately to woodland areas where comparatively few of the bugs normally hibernate and where serious injury to new forest growth resulted. It should perhaps be stated, however, that the main reason for abandonment of burning for control of this insect is its ineffectiveness and impracticability throughout much of the area concerned.

"Incidental to the extensive grasshopper control campaigns of recent years, it has been determined by the Bureau of Biological Survey that practically no injury to wildlife has resulted from the widespread use of arsenical baits where these baits have been scattered thinly in accordance with the recommendations and not left in lumps or piles. Although no definite data are at hand, it also seems very probable that the large-scale destruction of grasshoppers has been a material factor in preserving vegetation used as food and cover by wildlife.

"Preliminary investigation for the control of insect outbreaks on food plants utilized by wildlife has been undertaken in a few instances. Some study was made of an insect destroying wild rice in the Lake States and of the destruction of cat-tails on the marsh lands of Maryland. Wild rice is an important food for ducks and the roots of cat-tails are staple diet for muskrats. A few years ago the widespread defoliation of Ceanothus and other shrubs by tent caterpillars in Oregon and California was found to be greatly restricting the amount of browse available for deer and other grazing animals." (Avery S. Hoyt, Acting Chief of Bureau, Oct. 4, 1937.)

Farm Security Administration (Region II, Michigan, Wisconsin, and Minnesota).--"In planning and prosecuting our development work on the projects and in getting data for the wildlife management plans which we were instructed to prepare for each project, it was apparent that much information had to be obtained concerning the more important wildlife species, their numbers,

environment and trends in these particular areas. In the case of the Woodland Caribou, the Moose, the Sandhill Crane, the Snowshoe Rabbit and some other species, it appeared desirable to make some rather intensive studies. The project areas and our activities on them offered unusual opportunities for conducting such work. We, therefore, selected as project game managers some well qualified men and assigned appropriate investigative work to each of them in addition to his regular responsibilities in the development work.

"I am listing some of the subjects on which we have accumulated a good deal of information. Reports on some of these appear worthy of being published. All of them, and some of our forestry reports also, we find to be of value in preparing our rough drafts of the management plans for the project areas. Study of: Woodland Caribou in northwestern Minnesota with reference to its environment, habits, and food; Moose in northwestern Minnesota with reference to its environment, habits, and food; Sandhill Crane in central Wisconsin; 'Snowshoe Rabbit' (Varying Hare) in northwestern Minnesota; Prairie Chicken and Sharp-tailed Grouse in central Wisconsin; nesting, central Wisconsin game projects; Pinnated and Sharp-tailed Grouse booming grounds; new flowage areas above our dams to determine changes occurring in animal and plant life, central Wisconsin; improved trout streams to determine effectiveness of the various methods of treatment of the streams, central Wisconsin. Reports on: Trapping and banding programs, central Wisconsin and northwestern Minnesota; Ruffed Grouse survey, central Wisconsin game projects; Quail study, central Wisconsin game projects; Horned Owl food habits study in central Wisconsin game projects; Deer studies, central Wisconsin game projects and Beltrami project, Minnesota; banding of Varying Hare in northwestern Minnesota; fur inventories; food patch plantings; experimental fallow plots, central Wisconsin game projects; wildlife winter feeding; proposed food patch system, central Wisconsin game projects; planting programs; experimental plantings; aquatic planting, Beltrami project, Minnesota; phenological tables; plant collection, central Wisconsin game project; wildlife census work--various projects in Michigan, Wisconsin, and Minnesota; biological reconnaissance; transfer of Beavers, Beltrami project, Minnesota; stream improvement work; public use of project areas--game, fish, fur.

"Most of our activities in wildlife matters have been directed toward actual development of the areas. Large scale environmental improvements have been made for the more important species. Through the construction of numerous dams and dikes in carefully selected locations, water and marsh areas have been formed aggregating between 250,000 and 300,000 acres. Some of these areas are designed chiefly for waterfowl, some for muskrats and beavers, and some as big game wallows. Some long belts of marsh were formed along the border of projects to prevent fires from entering the project areas. Such marshes, of course, serve also as nesting grounds for ducks and as habitat for beavers and muskrats.

"A good deal of attention has been given to food and cover plantings in all the projects, the aggregate of such plantations being quite large.

"In our forestry work as much consideration has been given to the improvement of wildlife conditions as to the betterment of the forest itself. This, I think, is fully justified. We have attempted to 'break up' extensive uniform stands and to avoid making large plantations of any one species. Irregular strips of grass land and brush are left between the plantations. Thickets of White Pine and White Spruce are being established by planting these in large areas of good deer browse." (W. T. Cox, Regional Forester-Biologist, Sept. 25, 1937.)

Other Departments

National Park Service.--"Following is a list including, I believe, all of our important projects: (1) A study of bighorn sickness and reasons for the decline in population in portions of Glacier National Park, Montana. Dr. Richard M. Bond spent a number of weeks on this problem during last winter and will continue the study if trouble recurs; (2) The effects on wildlife of forest spraying with arsenate of lead by the use of auto-giro or ground machinery. J. O. Stevenson and Allen Frost; (3) Economic bearing of the food habits of coyotes at Lava Beds National Monument, California. Joseph S. Dixon and Richard M. Bond; (4) Coyote food habits. Study to discover the ecological status of the species in natural areas. Dr. Adolph Murie. This study was begun in May, 1937 and is expected to be about 80 percent completed by May, 1938; (5) General wilderness wildlife problems in the High Sierras of California, from Sequoia to Yosemite National Parks. E. Lowell Sumner, Jr.; (6) Trumpeter swan nesting studies, Yellowstone National Park. Rangers and naturalists of the park staff; (7) Range studies with reference to wildlife problems are being carried on in Grand Canyon, Rocky Mountain, and Yellowstone National Parks by members of the parks' staffs and by wildlife technicians. The most thorough investigation is the study of the northern Yellowstone elk winter range by Ranger Rudolph Grimm and of the food of the elk and bighorn of Rocky Mountain National Park by Park Ranger Merlin K. Potts; (8) A plant survey of Great Smoky Mountains National Park by Dr. H. M. Jennison. Field work completed; (9) A historical study of beavers in Virginia to determine the former economic status and the possibilities of reintroduction. William J. Howard; (10) A study of the effects of artificial lakes on wildlife possibilities." William J. Howard; (11) Studies of the fauna of the Big Bend National Park Project. A. E. Borell of the National Park Service, and herpetologists from the Field Museum and University of Michigan; (12) Study of the effects of stream improvement work in State parks and Recreational Demonstration Projects in New England. Maynard S. Johnson." (Victor H. Cahalane, Acting Chief, Wildlife Division, Oct. 1, 1937.)

RESEARCH BY STATE CONSERVATION DEPARTMENTS

Illinois.--The State Natural History Survey Division has the responsibility of developing the wildlife-research program. Its report on projects involving birds and mammals is as follows:

"Urbana Township game management area. A three-square-mile game management demonstration area is being developed in Urbana Township, Champaign

County. Several small unpastured areas were planted to cover-producing shrubs by the Survey in the spring of 1937. Some of the land owners planted grain feed patches. One survey member who lives on the area reared 25 pheasants and the Conservation Department furnished 10 quail to liberate in the fall of 1937. The area is to be conducted as a laboratory for demonstration and experiment in game management.

"Analysis of trappers' reports rendered to the Department of Conservation. The purpose of this project is to determine (1) centers of abundance and scarcity of each species of fur-bearer, (2) changes of abundance in such centers, and (3) monetary income resulting from sale of raw pelts.

"Feed patch experiments. Four mixtures of cultivated grains and another mixture which has been used for two years by the state sportsmen's clubs were planted in experimental plots in central and northern Illinois in the spring of 1937 to obtain data on mixtures best suited for use of wildlife in Illinois. Planting of six grain sorghums was also made on strip mine banks near Danville. Colby No. 10 milo and Cheyenne sorghum were the only ones that produced any seed on the strip mine soil.

"Cover planting experiments. About 20 kinds of wild and cultivated shrubs were planted in 1937 in experimental plots on the University farm to study their suitability for wildlife.

"Food habits of the quail. In addition to field observations, quail stomachs for analysis are collected from hunters and saved from birds taken for parasite studies.

"Food habits of the ring-necked pheasant. About 25 pheasant stomachs were collected from hunters during the hunting season of 1936.

"Life history and management of the prairie chicken. Prairie chickens occur locally in fair numbers in seven or eight gray silt loam prairie counties in south-central Illinois. Although their range is spotty, apparently there has been no serious loss of range in recent years. The prairie chicken study was begun in Jasper County in the summer of 1935 to secure facts for use in prairie chicken management. Nesting studies were made during the summers of 1935 and 1936. Population studies have been conducted since the summer of 1935. The Natural History Survey is cooperating with the Illinois Audubon Society in developing plans for one or more prairie chicken sanctuaries in the northern part of the state.

"Quail population study. We have conducted a quail census on a 2,560-acre study area in Jasper County in September, January, and March each year since 1935, to obtain data on the behavior of quail populations in one of our good hunting areas. We also obtained some records on nesting during 1935-36.

"Pheasant study. Since thousands of dollars are spent annually by the State and by sportsmen's organizations for pheasant propagation, it seems advisable to collect information on the ecology of Illinois pheasants. We

will, however, use material from studies that have already been conducted in adjoining states as far as possible. We conducted nesting studies in Champaign County in 1937 and have made observations on the local distribution of pheasants in this county at various times since early in 1937.

"Hungarian partridge population study. The Michigan Department of Conservation and the Illinois State Natural History Survey are cooperating in an annual January census of Hungarian partridges on a three-section study area in Lenawee County, Michigan. We have January counts for 1931, 1932, 1933, 1936, and 1937. It is hoped to conduct this January census over several years and to publish records on fluctuations of the partridge populations in this area.

"Census of waterfowl. Waterfowl numbers are estimated at intervals in autumn each year on Jack Lake near Bath, Illinois. These records will be analyzed from time to time to determine the relative numbers of each species and whether the numbers recorded are an index of waterfowl abundance in this region.

"Survey of parasites and diseases of fur-bearers. Viscera of about 40 fur-bearers obtained from trappers were examined in the fall of 1936. This project includes cooperation with the U. S. Biological Survey in post mortem examination of fur-bearers from the Federal Chautauqua Lake Sanctuary at Havana.

"Census of fur-bearers. Records of fur-bearers found on night field trips in which hunting dogs are used were compiled during the past winter and are to be obtained in succeeding winters.

"Survey of parasites of waterfowl. Duck viscera that are obtained from hunters or which come into the Survey from various sources are examined for parasites. This project includes cooperation with the U. S. Biological Survey in examination of crippled or sick waterfowl in the Illinois River.

"Studies of parasites of the prairie chicken. About 30 young and adult prairie chickens were collected during the summers of 1936 and 1937 and examined for parasites and diseases. This investigation was reported on briefly at the 1937 Midwest Wildlife Conference. The project supplements the prairie chicken study.

"Survey of parasites and diseases of the ring-necked pheasant and quail.

"Geographical distribution of the small mammals of Illinois. This project was begun in 1932 and includes compilation of distribution records on all non-fur and non-game mammals.

"Study of insect and bird relationships in the vicinity of shrub and grass areas. This is a cooperative project between the Sections of Economic Entomology and Game Management and Research of the Survey. It involves population counts of both insects and birds in the vicinity of hedges, grassland, and other cover areas, and attempted correlations between numbers of insects and insect-eating birds. Field work was begun in August, 1937.

"Survey of Illinois plants useful as food for game birds and animals. The purpose of this project is to develop a general knowledge of the occurrence, distribution, and general abundance of plants important as food in Illinois to birds and mammals." (Ralph E. Yeatter, Game Specialist, Nov. 18, 1937.)

Michigan.--The report on research activities of the considerable staff of the Game Division of the State Department of Conservation was presented in detail and in outline. Only the last is here reproduced.

"Farm-Game: Correlation of farm management and game management practices; Experimental food patch plantings; Correlation between pheasant populations and soil fertility; Methods of regulating hunting pressure in small game territory; Methods for promoting cooperation between hunters and farmers; Effects of controlled hunting methods on game supply.

"Upland Game Birds: Studies of ruffed grouse--Census methods, nesting brood mortality, cover requirements, disease studies, food habits, cover improvements. Prairie chicken and sharp-tailed grouse--Propagation, diseases, food habits, trapping and banding, range and distribution.

"Waterfowl: Banding, food habits, diseases and parasites.

"Big Game: Moose--Studies of overpopulation and overbrowsing on Isle Royale, live-trapping and removal of moose from the island to the mainland, food, life history. Deer--Deer population: Live-trapping and tagging to determine age, home range, summer and winter ranges, drifts, migrations; deer census drives, sex ratio, dead deer counts, antler age criteria. Deer habitat Inventories of summer and winter range, records of winter weather conditions. Deer hunting conditions. Food and cover management: Planting, release cuttings, controlled burning, controlled feeding experiments.

"Small Game: Cottontail rabbits--Life history: Range of individuals, population, sustained hunting yield. Food patch plantings; breeding habits; cover. Fox squirrels--Life history: Population and habitat distribution, sexual rhythm, nesting habits.

"Fur Bearers: Beaver--Population and life history study of beavers, size distribution of the beaver taken during the open hunting seasons, sex ratio of trapped beaver, gestation data from trapped beaver, quality of the furs taken from beaver trapped during the open season, damage to beaver pelts resulting from fighting. Skunk--Life history: Breeding habits and gestation period, population, food habits and nest predation.

"Predators: Ecological studies of wolves, coyotes, red foxes, bobcats, and otters, including--Relative populations; cruising ranges; food habits: analysis of stomachs, scats, and left over food items; tracking to determine nature and extent of forays.

"Ecological Studies (Cottontail rabbit, fox squirrel, skunk, ringneck pheasant, and bobwhite quail): Population, breeding habits, food habits, use of cover, plant habitats and food resources, winter food patches.

"Pathological Examinations: Yearly checks on disease incidence in ruffed grouse, sharp-tailed grouse, prairie chicken, and white-tailed deer; wildlife cycles; life histories of certain parasites of game animals and birds: Zygocotyle lunatum (a caecal fluke of ducks and shore birds), Amphimerus elongatus (pancreas and liver fluke of waterfowl), Oxyspirura

petrowi (eye worm of ruffed grouse, prairie chicken, and sharp-tailed grouse), Protostrongylus coburni (lungworm of deer), Hasstilesia tricolor (intestinal fluke of cottontail rabbits); pathological and biochemical studies in connection with experimental feeding of white-tailed deer; incidental work on various game species in relation to population changes of a non-cyclic nature, i.e. starvation, poisons, etc.

"Miscellaneous: Studies in developing cutting specifications under which commercial loggers may be permitted to log state-owned, over-mature deeryarding areas with the object of increasing the natural food supply; reconnaissance of large areas of submarginal land to determine the desirability of game cover, subsequent acquisition and management; ground cover.

"Wildlife Experiment Station: Life history, habits, management, and propagation of economically important birds and mammals; habitats including farm land, river-bottom woods, marsh, and upland scrub oak."
(H. D. Ruhl, In Charge, Game Division, Oct. 1, 1937.)

New York.-"In compiling a summary of the research activities with respect to game for the Conservation Department of this State, it seems most logical to take up the items in accordance with the different species or projects to which they are particularly related.

"Ruffed Grouse: For the past seven years a survey of the status and life history of this species in New York State has been in progress and is being continued. The purpose of the investigation has been to evaluate the various factors affecting the normal life history of this species, to discover if possible which of these are involved in local and in cyclic fluctuations, and to develop management practices by which environment may be improved. Field work has been conducted on over 10,000 acres divided mainly among four areas representative of the primary types of environment in this State. The work has been both intensive and comprehensive. The following nine major factors affecting the species have been studied in detail and correlated: Shelter, food and water, general habits, weather, enemies, man, diseases and parasites, reproductive capacity, and the practicability of artificial propagation.

"Some idea of the scope of this program may be gained from the following facts: Over 7,000 man-days have been spent in field research, about a quarter of which have been devoted to the statistical tabulation and analysis of the data recorded on form sheets in connection with the observation of 19,619 adult grouse flushes, 1,515 grouse brood flushes, 1,288 grouse nests, over 1,000 grouse drumming logs, and 702 grouse found dead; about 4,000 man-days have been spent in investigating the practicability of artificial propagation during the course of which 1,202 grouse have been hand-raised to maturity. Among the more important problems studied during this time are:

"Shelter--Detailed analysis of habitat composition; determination of seasonal shelter preferences and their relation to varying weather conditions.

"Food and Water--Determination of food preferences through the analysis of 346 adult grouse stomach contents, representative of the whole State during each season of the year; and of 206 grouse chick stomach contents, representative of the whole State; Comprehensive determination on typical

sample plots in each type of cover on areas representative of both woodlot and forest range of the insect life available to chicks during June of 1936, and on the former type in 1937.

"General Habits--Notation of a large amount of data as to the behavior of the birds themselves under various conditions as a means of evaluating the significance of this behavior in the life history of the grouse.

"Weather--Notations insofar as possible of effect of various weather conditions experienced during investigation; Detailed analysis of the U. S. Weather Bureau records from the Albany and Ithaca stations since 1890, in an attempt to correlate changes in these conditions with fluctuations in grouse abundance.

"Enemies--Study of the food habits of predatory birds and mammals in New York State through the analysis of a large number of stomach contents, pellets, and droppings; Detailed studies of the way in which important predators kill grouse and eat their eggs, as a means of diagnosing remains of individuals found dead and of identifying the predators responsible for nest destruction.

"Man--Determination of the effect on grouse populations of normal hunting pressure; Experimental studies of the effect of breaking up extensive tracts of uniform cover types.

"Diseases and Parasites--Continuous checking of the possibility that disease or parasitism may become important, by the annual examinations of about 200 adults and 150 chicks, representative of all parts of the State and of each season.

"Reproductive Capacity--Determination of sex ratio on each area each year, and of the proportion of birds breeding; Yearly comparisons of the average number of eggs laid, their fertility, their hatchability, and the viability of the chicks; Determination of mortality from all causes during each life period; Determination of population fluctuations on each major study area as of April and September, based on detailed 100% censuses; Experiments with respect to the productivity of different degrees of population density in relation to carrying capacity of the covert.

"Practicability of Artificial Propagation--Evaluation of all known techniques with respect to all phases of artificial propagation; Determination of the rapidity with which hand-reared grouse revert to the wild when liberated.

"Unclassified--Investigation of the physiological reactions of grouse, especially with respect to the effect of various light conditions on the breeding cycle; Compilation of a comprehensive annotated bibliography of the available literature relating to grouse in accordance with the various factors affecting the abundance of the species.

"Ring-necked Pheasants: Research with respect to pheasants has had three primary aims. The first has been to develop more economical methods of artificial propagation and distribution. The second has been the study of

the occurrence and significance of winter starvation and to determine the most practical way of alleviating it. The third has been to check the occurrence of disease and parasitism, both in captivity and in the wild.

"Studies of incubation and the determination of optimum feed rations have been carried on at Cornell University for four years under a cooperative arrangement between the Conservation Department and the State College of Agriculture. In all, 17,300 pheasant eggs have been devoted to the incubation study, while in the feed ration development, about 7,000 birds were utilized in preliminary experiments and 9,000 in subsequent checking. In addition, at the Experimental Game Farm, extensive experiments with brooding equipment have been made as compared with the range method as used on several of the other farms.

"In the starvation study, in addition to personally investigating many of the instances reported, many tons of grain have been distributed with the aid of interested sportsmen. Furthermore, 28 food patch mixtures comprising 39 species have been tested in four different soil types in the State.

"Subjects on which work is anticipated in the future include: Study of relative survival of liberated birds with respect to age and to origin, as to whether brooder or range reared, as a basis for future policy; Evaluation of possible need for liberating a higher proportion of male birds; Determination of relative nutritive value of various grains comprising recommended feed mixtures; Study of the effect of variations in light conditions on the breeding cycle.

"Quail: The principal research with relation to this species has been a determination of the success of restocking these birds in the 44 counties of the State where they formerly occurred. The method used has been to stock the best coverts of each of these counties over a four-year period, and then check results by means of a survey during the breeding season. Incubation studies, in which 7,300 quail eggs were utilized, have also been carried on in cooperation with the State Agricultural College at Cornell.

"Ducks: With respect to ducks, four main projects have received attention. Attempts are being made to develop a strain of wild black ducks which will breed satisfactorily in captivity. Also to develop a cross between the wild black duck and the so-called 'Flanders' duck, which will possess the wildness of the black and the breeding potential of the 'Flanders'. If successful, such strains will be used to build up the breeding stock of this species in suitable areas over the State. A third project has been to test the value of spring liberations of farm-raised mallards on suitable wild sites as a means of building up local breeding stocks of this species. Still another project has been to determine the most effective age at which to liberate young mallards. In this work, over 1,700 adult and 1,500 young ducks have been used.

"White-tailed Deer: Over the past six years a detailed study has been carried on as to the significance of the various factors affecting deer on their wintering grounds, with especial reference to the Adirondack region. The program comprised laboratory work at Cornell in cooperation with the

State College of Agriculture, experiments with captive deer under natural conditions, and field work on one of the most important wintering grounds in the Adirondacks. Approximately 500 man-days have been spent in field work, and 300 man-days in laboratory study, and about 30 individual deer have been studied.

"Among the more important problems studied during this time may be noted: A detailed study of the preferences of deer for various species of browse which comprise their winter diet in this State, to aid in evaluating winter range; A laboratory study of the nutritive requirements, including a comparison with domestic forms to establish a base line for further nutritional work; Development of a very palatable and highly nutritious food cake for emergency use; Investigation of the factors involved in the annual winter loss, and determination of the most important 'hunger belts' as well as characteristics of the range in general; Study of the effectiveness of artificial feeding with various materials, with special attention to the new concentrated cake, and the requirements for a satisfactory material for remote areas; Observations of the effect of different weather conditions on deer during the winter; Determination of the need for open water during the winter; Determination of the occurrence of diseases and parasites; Notation of a considerable amount of data as to the daily range, habits, movements, and cover preferences of deer on their wintering grounds.

"Factors which will receive attention as rapidly as possible include: More detailed analysis of existing range conditions as a basis for zoning the State with respect to management of deer; Determination of population densities, sex ratio, fawn production and time and characteristics of the rutting season, as a basis for future management policy; Evaluation of the carrying capacity of different types of range and correlation of these with other factors; Determination of the relative chemical composition and nutritive quality of important browse foods growing on different soil types; Investigation of the effect of hunting on herd composition and productivity, and correlation with population densities and range carrying capacity.

"With respect to future study of this species, it is hoped that it will be possible to increase the scope of the work to include the complete life history.

"Rabbits: Little research has been done with regard to this species, except for the pathological examination of both wild and imported specimens. However, it is becoming increasingly important that a study be made of the value of liberating imported stock.

"Pathological Examination of Game: For the past six years, a full-time Pathologist has been in the employ of this Department, whose job it has been to investigate the nature and occurrence of diseases and parasites among the wildlife of this State, including game, fur-bearers and predators. In addition to the study of these conditions in wild individuals, a fairly careful check has been kept of the situation on the various game farms. In the course of the work, over 4,000 individuals of wild game; 500 predators; and 13,000 specimens from game farms have been handled, representing over 20 different species." (Gardiner Bump, Superintendent, Bureau of Game, Oct. 28, 1937.)

Wisconsin.--Active projects at the State Experimental Game & Fur Farm, Poynette, are:

"Experimental Section--Propagation, crossing, experimental feeding, and stocking of black, cross, and gray raccoons; Experimental feeding and housing of red, cross, silver-black, and blue foxes; Experimental feeding and housing of Yukon and eastern minks; Propagation and stocking of untested exotic game birds, including the Reeves, Elliott, and Nepal Kaleege pheasants, and the Chukar partridge; Additional experiments include test plantings of the Formosan and Old English Blackneck pheasants, valley partridges, and wild turkeys; One of the principal research activities of the game farm has been the development of various types of electric brooders and continued experimentation in artificial incubation.

"General management--Experimental food patch planting with cooperative sportsmen's projects and on wildlife refuges; Establishment of experimental game food nursery producing 110 varieties of game food trees, shrubs, plants and vines at Wisconsin Rapids (distribution this fall will be approximately a half million trees, shrubs, and plants); Experimental bird banding of all game birds released on Wisconsin licensed shooting preserves; Cooperative grouse banding with the University of Wisconsin." (H. W. MacKenzie, Conservation Director, Oct. 4, 1937.)

(To be continued)

NOTES AND NEWS

Cooperative Wildlife Research.--Investigations for improving methods of managing wildlife on forests and farms and other biological studies will be undertaken at a new wildlife research unit being established at State College, Pa., by the Pennsylvania State College, the State Game Commission, and the U. S. Biological Survey. A cooperative agreement of the three agencies for setting up and maintaining the research unit was recently approved by the Secretary of Agriculture. Pennsylvania is the 11th State to enter into a cooperative agreement with the Biological Survey for investigating ways and means of fitting wildlife resources into land-use programs. Forest and farm-game problems will receive equal attention at the new research unit. Dr. Logan J. Bennett, leader of the Iowa research unit at Ames since its establishment in September 1935, on March 1 assumed charge of the new work in Pennsylvania.

To succeed Dr. Bennett in Iowa, Thomas G. Scott, extension wildlife specialist, has been appointed. The Iowa unit was organized September 24, 1935, under a cooperative agreement by the State Conservation Commission, the Iowa State College, the American Wildlife Institute, and the U. S. Biological Survey. Wildlife being studied in the research projects include the ring-necked pheasant, bobwhite quail, waterfowl, cottontail rabbit, raccoon, muskrat, and skunk. As a specialist in wildlife conservation for the Iowa State Extension Service since October 1935, Mr. Scott has helped advance the program for wildlife improvement on Iowa farms. He also is the author of several bulletins on birds and mammals, his most recent being "Mammals of Iowa." Mr. Scott received his B.S. and M.S. degrees from Iowa State College, where he has completed work toward a Ph. D. degree.

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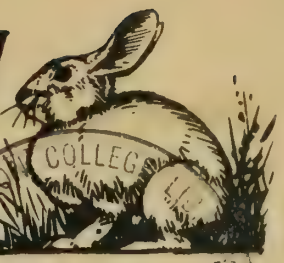

AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
ISSUED FOR THE INFORMATION OF COOPERATORS
BY THE
BUREAU OF BIOLOGICAL SURVEY
UNITED STATES DEPARTMENT OF AGRICULTURE

COLLEGE
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Washington, D. C. No. 14 May, 1938

Conservation: Birds in Europe

Storer, Tracy I. Relations between man and birds in western Europe, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 40(2), March-April 1938, pp. 63-70, figs. 24-26.

Human influences on birds through alteration of habitat, legislation, management, and utilization, including sale in markets (prices quoted). Inspection of the European situation encourages the author to believe that American "bird populations may be expected to persist, with but limited modification, for many generations."

Conservation: Esthetics

Leopold, Aldo. Conservation esthetic, Bird-Lore (1775 Broadway, New York, N. Y., 30 cents a copy), 40(2), March-April 1938, pp. 101-109, 4 photos.

Something all should read, although it may be that each will see in it chiefly that which agrees with his own ideas of conservation. "Recreation has become a self-destructive process of seeking but never quite finding; a major frustration of mechanized society." "as mass use increases it tends to push the whole gamut of conservation techniques toward the artificial end." "Artificialized management x x x has paid dividends to one citizen out of capital stock belonging to all." "the fresh-air and change-of-scene component is like the photographic trophy--it withstands mass-use without damage." "Perception x x x nature study x x x entails no consumption and no dilution of any resource." "The only true development in American recreational resources is the development of the perceptive faculty in Americans." "The disquieting thing in the modern picture is the trophy-hunter who never grows up, in whom the capacity for isolation, perception, and husbandry is undeveloped, or perhaps lost." "It would appear, in short, that the rudimentary grades of outdoor recreation consume their resource-base; the higher grades, at least to a degree, create their own satisfactions with little or no attrition of land or life. It is the expansion of transport without a corresponding growth of perception which threatens us with qualitative bankruptcy of the recreational process. Recreational development is a job, not of building roads into lovely country, but of building receptivity into the still unlovely human mind."

Conservation: Hawks

Luttringer, Leo A., Jr. Outlaws of the air--or are they?, National Sportsman (350 E. 22nd St., Chicago, Ill., 10 cents a copy), 79(5), May 1938, pp. 12-13, illus.

Summarized report on analyses of the contents of about 1,350 stomachs of hawks killed in Pennsylvania. The common species were represented by large enough numbers to give the findings significance. They agree with those of previous investigations and point only to the Cooper's and sharp-shinned hawks and the goshawk as subject to control. "The others are not only harmless under normal conditions, but very frequently are beneficial, particularly to farmers."

Such remarks on the part of the Biological Survey have been decried as propaganda, so it is hoped their strict confirmation by a State game commission will convince some doubters. The author states that there was evidence in a number of instances that prey had been wounded or crippled before being taken by the hawks. He notes efforts to curb hawk shooting as a sport, including the establishment of Hawk Mountain Sanctuary.

Conservation: International wildlife protection

Brouwer, G. A. The organisation of nature protection in the various countries, American Committee for International Wild Life Protection (185th St. and Southern Blvd., New York, N. Y.), 112 pp., January 1938.

Translation of the greater part of a book written 1926-29 and published in Dutch in 1931 with supplemental notes by the author that bring it more up-to-date. General discussion pertains to the motivation and significance of efforts toward nature protection, the urgency of such protection, the preservation of nature monuments (geological, botanical, zoological), and history of international nature protection. The bulk of the book is made up of accounts by countries (grouped according to continents) which note organizations concerned in conservation, name outstanding nature preserves, and cite pertinent literature. The importance of the bibliographic feature of the work is indicated by its extent--395 titles. North America is allotted 12 pages and 50 titles.

Conservation: Theory

Hagar, Joseph A. We need more realism in conservation, New England Museum of Natural History (Boston, Mass. Reprinted from January 1938 Bulletin of the Massachusetts Audubon Society, 66 Newbury St., Boston, 5 cents a copy), 87, April 1938, pp. 3-11, 1 fig.

Notes on the conflicting suggestions and claims that come to the official conservationist from persons considering only particular phases of the subject. Need of assembling and digesting all possible evidence as a basis for action and of an unemotional approach to conservation problems. The goal of Nature is preservation of species rather than of individuals. There being annual reproductive effort, and populations remaining about the same from year to year, many individuals must die. Some of the life hazards of birds are discussed and symbolized in a graph as barriers young must surmount to survive in the next adult generation. Individuals passing one barrier probably will be eliminated by another one. The most important hazard--or limiting factor--is the one that must be altered to cause actual increase or decrease of a species. There is a very narrow margin between a decreasing and an increasing species. A comparatively small increase in the rate of survival may mean a great increase in the total number of individuals, saving two out of a theoretical seasonal brood of ten young robins, for instance, would double the breeding population. A wider understanding of how Nature controls survival will advance conservation by focusing attention and effort on really vital matters. Breeding stocks must be maintained but surpluses will be eliminated, the exact time and method being of minor importance. [Comment: A desirable discussion which abides very well by underlying principles, but which is, perhaps, too indulgent as to man's activities. It has been a long time since man could be classed among

"natural" enemies of wildlife; his increase is not checked by diminution of his prey as is the case with natural enemies. The destructiveness of modern man in both direct and indirect ways is on too great a scale and only rarely is it confined to surpluses.]

Conservation: Water birds

Sprunt, Alexander, Jr. Beautiful birds of the southern Audubon sanctuaries, National Association of Audubon Societies (1775 Broadway, New York, N. Y., $1.00 a copy) Bul. 8, 39 pp., 11 colored plates, 2 halftones, April 1938.

So far as this report is formal, it is an account of 16 species of the larger water birds (spoonbill, wood ibis, brown pelican, limpkin, 9 herons, and 3 true ibises) of the Gulf Coast, including for each the standard vernacular and scientific names (with derivations of the latter), local names, and statements of former and present ranges in the United States. Most of the text is informal and it conveys in excellent writing impressions of the author's field experiences that are vivid and refreshing. In some cases appearance, singly or in masses, is stressed, in others interesting habits, and for all, forthright conservation doctrine is earnestly presented.

Control: By electric fence

Nicholson, Arnold. Touch me not, Country Gentleman (Curtis Publishing Co., Philadelphia, Pa., 10 cents a copy), 107(11), Nov. 1937, pp. 20-21, 72-73, 2 cartoons.

Development of electrified fence for controlling stock; how it works; cautions. Instances of its use in wildlife management include items referring to deer, elk, rabbits, coyotes, and feral cats.

Control: Ground squirrel in relation to quail

Horn, E. E. Some relationships of quail and ground squirrels in California, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(2), April 1938, pp. 58-60.

A few definite instances of ground squirrels molesting quail eggs and the apparent effect of eradication of these rodents in increasing the number of quail on a 15,000-acre stock range.

Cycles: Snowshoe hare

Green, Robert G., and Carl L. Larson. Shock disease and the snowshoe hare cycle, Science (The Science Press, Lancaster, Pa., 15 cents a copy), 87(2257), April 1, 1938, pp. 298-299.

An investigation carried on in Morrison County, Minnesota, since 1930 revealed that snowshoe hare populations decreased annually since 1933. Then there were about 478 hares to the square mile; in 1936 there were 164; and in

1937 "the numbers are so low that any enumeration will be difficult." Shock disease is now announced as the primary cause of the periodic decimation of the species. Its symptoms, lesions, and occurrence in the wild as well as the methods by which it was studied are briefly stated.

Destruction: Bob-white in winter

Wade, Douglas E. Death is upon them, Bird-Lore (National Association of Audubon Societies, 1775 Broadway, New York, N. Y., 30 cents a copy), 40(1), Jan.-Feb. 1938, pp. 7-10, 2 photos.

The subtitle, "The record of a weather-killed bob-white covey" abstracts the paper. It is a well-written account of the fate of a group of 32 birds wrought by simultaneous pressure from snow, cold, wind, and predators. Wisconsin.

Destruction: Waterfowl by drouth

Furniss, O. C. The 1937 waterfowl season in the Prince Albert district, central Saskatchewan, Wilson Bulletin (Sioux City, Iowa, 60 cents a copy), 50(1), March 1938, pp. 17-27, fig. 8, 7 tables.

Those inclined to think that the drouth cycle so disastrous to waterfowl is a thing of the past should give heed to this paper. In his opening sentence the author states that, "The 1937 waterfowl season in the Prince Albert district has been far less favorable than x x x former seasons." He adds that "a remarkable decline in the number of broods has taken place" and that "water levels reached their lowest x x x in the lifetime x x x of the oldest settlers." The dwindling water area, cover, and food are described, and counts of the breeding waterfowl population for 1935, '36, and '37 are given by species. The agents of nest destruction and the percentage of loss caused by each are recorded for the 3 years and statistics are given on hatch and on brood size. Those for brood size show an average decrease of 48.86 percent for 11 species in 1937 as contrasted to averages for 1934 and 1935. The author's summary is:

"A general summary reveals that until the late summer of 1936 conditions on the whole were very satisfactory when compared with other points, even though there has been a gradual lowering of water levels during the last fifteen years. The last two summers, exceedingly hot and dry, have dried up breeding sloughs and potholes, and any advantage that this district had when compared with other surrounding areas has almost disappeared. The decrease in waterfowl due to such predators as Crows and Marsh Hawks seems, as far as this area is concerned, to be greatly exaggerated. The oft quoted statement that as conditions in southern Saskatchewan and the northern parts of the United States became unsuitable for waterfowl they migrated and nested farther north appears unproved. Even when conditions here were nearly normal and conditions elsewhere much worse, there was no new influx of birds. The total number of young birds decreased this year (1937) by fifty per cent and the broods by almost the same figure. The decrease in the numbers of Lesser Scaups in the spring census is reflected again in the decrease in broods. The severe drought throughout the southern portions of the Prairie Provinces will not be off-set by the halting conservation policies at present in force and continued open seasons."

Diseases and Parasites: Bird malaria

Herman, Carlton M. Bird malaria and mosquito control, Bird-Banding (Charles B. Floyd, 210 South St., Boston, Mass., 75 cents a copy), 9(1), Jan. 1938, pp. 25-31.

Blood parasites causing malaria in birds belong to the genera Leucocytozoon, Haemoproteus, and Plasmodium. Only the last-named genus is shared by birds and man and there are no known species in common. Notes on diagnosis by blood smears, and the effects of the disease on birds. Transmission is by culicine mosquitos, not anopheline as for human malaria. There is something to be said for control measures (about the same as in the case of human malaria) for the sake of the birds themselves but the need is not at present known to be urgent. Control measures should be those least detrimental to wildlife. Bibliography of 9 titles.

Diseases and Parasites: Grouse

Boughton, Rex V. Endoparasitic infestations in grouse, their pathogenicity and correlation with meteoro-topographical conditions, University of Minnesota Agr. Expt. Sta. (St. Paul) Technical Bul. 121, 50 pp., 12 figs., 4 maps, 10 tables, August 1937.

Review of grouse cycles and postulated causes of mortality in Great Britain and in America. Results of study of 560 ruffed and 62 sharp-tailed grouse from Minnesota, South Dakota, Michigan, and Wisconsin. The methods of the study are described. There is a check-list of the parasitic forms revealed by the investigation--15 kinds--and a detailed account of each form, including synonymy, list of hosts, description, and distribution. Relative frequencies of occurrence of the parasites of the two species of grouse and also their seasonal and local incidence are tabulated and discussed. Pathogenicity of the parasites is considered and the general conclusion drawn that, as observed in this study, they did not appear to have materially affected the health of the birds. There is correlation between parasitism and environmental factors, especially precipitation, temperature, and soil texture. "The writer feels reasonably certain that the parasites found during this investigation were not responsible for the decline in the adult grouse population recorded in the state during the summer of 1933." The parasites, however, may kill off young birds in considerable numbers--a matter that needs further investigation. Bibliography of 55 titles.

Diseases and Parasites: Haemoproteus in black duck

Herman, Carlton M. Haemoproteus sp. from the common black duck, Anas rubripes tristis, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 24(1), Feb. 1938, pp. 53-56, 1 fig., 1 table.

Six out of 85 birds examined harbored low grade infections of this blood parasite. The record is first for the black duck and apparently also for any North American duck.

Diseases and Parasites: Screw-worm

Lindquist, Arthur W. Myiasis in wild animals in southwestern Texas, Journ. Economic Entomology (E. N. Cory, College Park, Md., 75 cents a copy), 30(5), Oct. 1937, pp. 735-740, 2 photos.

Abstracted by the following quotations: "The suggestion has been made that wild animals serving as hosts of Cochliomyia americana must be a constant source or reservoir of screwworm infestation for domestic animals, and aside from its being one of the worst problems with which ranchmen must contend, this pest is a factor in game conservation, because it takes a yearly toll of game animals."

"The cottontail, the jack rabbit, the opossum and the deer were found to harbor natural infestations of the screwworm, Cochliomyia americana. A total of 37 cases of myiasis in wild animals were studied. The fact that wildlife serves as a considerable source of infestation of the screwworm makes more difficult the control in livestock. Four per cent of the rabbits may carry infestations of C. americana. The predisposing causes which render animals subject to fly attack are rabbit bots, gunshot wounds, boils, disease, birth of young, injury by predators, fighting, and brush and wire cuts. Infested wild animals should be treated whenever practicable and maggot-infested carcasses promptly burned. Effective control of screwworms in livestock should result in fewer attacks on wildlife."

This article has a bibliography of 3 titles, and the immediately preceding paper in the same journal, devoted to myiasis of domestic animals, one of 12 references.

Diseases and Parasites: Silicon poisoning

Gray, Ernest. A curious case of supposed silicon poisoning in the swan, Nature (St. Martin's St., London, W.C. 2, England, 2 shillings a copy), 141(3560), Jan. 22, 1938, p. 163.

Fatal enteritis resulting from mechanical irritation caused by diatom shells and free silicon in a colloidal state present in an ornamental pond. After thorough cleaning of the pool, no further cases have been reported.

Ecology: Of burned areas

Reid, Elbert H., Leo A. Isaac, and G. D. Pickford. Plant succession on a cut-over, burned, and grazed Douglas fir area, Pacific Northwest Forest and Range Experiment Station (Portland, Oreg.) Forest Research Notes, 26, 8 pp., 1 fig., 2 tables, mimeographed, March 1938.

Authors' summary: "On a cut-over and burned Douglas fir area adjacent to the Wind River Experimental Forest, in southwestern Washington, observations as to plant succession were made during the period 1925-35, inclusive. Of the 85 plots on which observations were made, 20 had been burned over once, soon after logging, in 1919; 44 had been burned over soon after logging and after a

4-year interval had been reburned, in 1924; and 21 had been burned over once, 2 years after logging, in 1921. All the plots were subjected to grazing by sheep from 1925 to 1935. Grazing removed practically all the current growth of herbs and shrubs in 1925 and 1926; in later years, it was lighter and less prolonged. By 1935, the composition of the vegetation had so changed that grazing use was impractical.

"Weeds, principally fireweed, formed approximately 50 percent of the total plant cover in 1925, 1 to 5 years after burning. In 1935, weeds were but a minor part of the vegetation, having been replaced by bracken on the double burn and the delayed burn and by shrubs (blackberry, vine maple, etc.) on the single burn. Reduction of weeds took place almost entirely between 1925 and 1927, the period of heaviest grazing.

"Fire hazard was temporarily lowered by removal of the highly inflammable fireweed. On the double and delayed burns, the initial decrease in fire hazard was counteracted by the rapid and militant encroachment of bracken, which tends to become almost as inflammable as fireweed. On the single burn, substitution of shrubs for weeds has resulted in permanent reduction of fire hazard and considerably improved conditions for reforestation.

"Grazing probably hastened the reduction in density of weeds, which are eaten readily by sheep, and thus favored increase in bracken or shrubs.

"The data indicate that on cut-over Douglas fir lands similar to those used in this study and subjected to similar treatments the forage supply is ample during the 3 to 7 years following burning but dwindles thereafter, and that the potential duration of grazing on such lands is approximately 11 to 15 years."

"Forage supply" as used in the last paragraph means grasses, grass-like plants, and weeds. For application to wildlife, therefore, the findings are more significant for grazers than for browsers. The latter presumably would find conditions suitable for some years after the end of the best grazing period.

Ecology: Drought in relation to Hungarian partridge

Errington, Paul L., and F. N. Hamerstrom, Jr. Observations on the effect of a spring drought on reproduction in the Hungarian partridge, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 40(2), March-April 1938, pp. 71-73.

During a dry year, 1934, cover was much reduced and the proportion of nest destruction greatly increased. The causes of loss, however, were of the same nature as in other years. By re-nesting the partridges were able to rear a substantial number of young. The net losses may have been due to over-population rather than to drought. Pheasants laid eggs in 10 partridge nests; proportion of eggs 33:114. Predation was somewhat intensified in part apparently due to conditions associated with the drought. The general effect was of retardation and decreased productivity of the nesting season rather than of failure.

Ecology: Marsh in relation to waterfowl

Moffitt, James. Environmental factors affecting waterfowl in the Suisun area, California, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 40(2), March-April 1938, pp. 76-84.

Making of ponds by geese, and deepening of ponds with resultant changes in their ecology by waterfowl and carp. Destruction of duck ponds by cattle and hogs. Effects of burning, both good and bad. Control of water level in relation to waterfowl. Effects of baiting, dredging, flooding with salt water, and of mosquito control operations. Selective shooting in relation to waterfowl populations; history of change in abundance of the species. Effect of establishment of a refuge and comment on shooting regulations.

Ecology: Mosquito control operations

Bradbury, Harold M. Mosquito control operations on tide marshes in Massachusetts and their effect on shore birds and waterfowl, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(2), April 1938, pp. 49-52, 1 pl.

Partial restoration of drained marshes and the satisfactory results.

Ecology: Populations, fox squirrel

Baumgartner, Luther L. Population studies of the fox squirrel in Ohio, Ohio Wildlife Research Station (Ohio State University, Columbus) Release No. 70, 6 pp., 5 tables, mimeographed, Feb. 1938.

The fox squirrel is normally sedentary, the average distance from original point of capture for 141 retrapped animals being 149 yards, the greatest 375 yards. Pastured woodlots were less favorable for squirrels than unpastured, the average number of these rodents to the acre for the two types of habitat being 67.06 and 78.90, respectively. Winter feeding resulted in definite increase in the squirrel population. Of various methods of determining numbers, count of occupied leaf nests was best, apparently indicating, 1:1, the adult population. Sex ratios are given for the catches of squirrels by months; they vary but significance of the variation is unknown. The largest sample (954 in fall) had 55.5% males. Location of leaf nests is analyzed, the food habits are summarized, and weights and measurements of numerous specimens are given.

Ecology: Vegetation surveys

Stewart, George, and S. S. Hutchings. The point-observation-plot (square-foot-density) method of vegetation survey, Journ. Amer. Soc. of Agronomy (Geneva, N. Y., 60 cents a copy), 28(9), Sept. 1936, pp. 714-722, 1 fig.

Authors' summary:

"1. A new plot method of vegetation survey, known as the point-observation-plot method, has been devised by ecologists of the Intermountain

Forest and Range Experiment Station. This method has many distinct advantages over the ones formerly used. It has been nick-named the 'square-foot-density' method because data are recorded in that unit.

"2. The point-observation plot is usually 100 square feet in area, and for convenience is circular, though there is nothing essential in the shape of plot. The plot is marked off by drawing a circle around a central point which is located mechanically and in no way selected. Locating the plot mechanically without selection gives it randomness--an absolutely essential point in sampling an area.

"3. One man can take data on from 30 to 50 plots in a day, thereby makir possible full replication of observations--a second absolutely essential quality to statistically reliable data. Plots are replicated 10 or 20 (or other multiples of 10) times to afford representativeness and replication. Such replication may be in a line transect of plots or in a network of plots more or less equi-distant in one or more directions.

"4. Separate workers can easily check with each other, i.e., one worker can duplicate another's data, if they practice together for a short time before beginning the survey.

"5. Comparisons can be readily made of 'protected' and heavily grazed areas, or of other range conditions.

"6. The method is suitable for depletion surveys, for forage inventories and for permanent plots; also for studies in range and pasture management, in erosion surveys, in agronomy, and in ecological observations.

"7. Furthermore, it makes possible a statistical analysis of the data by probable errors, by analysis of variance, or by the correlation method."

Economics: Mammal harvest in Ohio

Hicks, Lawrence E. The status of game mammals in Ohio, Ohio Wildlife Research Station (Ohio State University, Columbus), Release No. 73, 6 pp., 5 tables, mimeographed, Feb. 1938.

Synopsis of past and present occurrence of mammals in the State. The number of kinds now represented is 59, of which 8 are fur, and 3 game, species. The fur catch in two counties is analyzed and that for the State estimated (1,894,000 pelts). The abundance of 3 species of squirrels by ecological divisions of Ohio is tabulated and their importance as objects of sport commented on in text. The kill is estimated at 1,310,000 in 1936. The cottontail bag totals from 4 to 6 millions annually. Bibliography of 16 titles.

Education: 4-H Club work

Yeatter, Ralph E. Illinois conservation activities manual for 4-H Club members, Univ. of Illinois Extension Service in cooperation with Illinois State Natural History Survey (Urbana), 27 pp., 27 figs., Feb. 1938.

A handbook for the 4-H Club member interested in wildlife and its conservation. Sixty camp scholarships are to be given to those making the best record of accomplishment in this field. The pamphlet discusses the aims of wildlife management and gives recommendations, supplemented by illustrations, as to cover, aids to nesting, feed patches, winter food, and water. There is a section on fur-bearers and small game mammals, and others on predators, and on cover-mapping, and census-taking. Suggestions are made for seasonal conservation activities and there is a list of 16 publications for supplementary reading.

Education: Questions on conservation

Visher, Stephen S. Aids to the student of conservation. (John Wiley and Sons, Inc., New York, N. Y.), 32 pp., 1937.

Review questions and thought-provoking questions concerning the book, "Our natural resources and their conservation," edited by Parkins and Whitaker. (Abstracted in WILDLIFE REVIEW, No. 7, Dec. 1936, pp. 27-28.)

Food Habits: Birds vs. bot-flies

Hiller, Wm. Control of the nasal bot-fly, Pennsylvania Game News (Board of Game Commissioners, Harrisburg, Pa., 10 cents a copy), 9(1), April 1938, p. 27.

Observations in Germany showed that flycatchers fed on adult bot-flies. Their numbers were increased by providing nest-boxes and in 3-4 years they apparently consumed so many of the insects that the number of infested deer very materially decreased. Suggestion that a similar process is possible in America; most of our flycatchers, however, do not nest in cavities so are not so readily encouraged.

Food Habits: Deer damage to jack pine

Anon. Deer damage to jack pine plantation in Minnesota, Lake States Forest Expt. Sta. (St. Paul, Minn.) Forest Research Digest, Spring 1938, pp. 4-5.

Count in a rabbit-proof enclosure showed 73% browsing attack by deer. On entirely unfenced areas it is more severe. The prohibitive cost of fencing is cited but lightly constructed electrified fence probably was not considered.

Food Habits: Grit consumption, pheasant

Dalke, Paul D. Amount of grit taken by pheasants in southern Michigan, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(2), April 1938, pp. 53-54, 2 tables.

The amount varies with age and according to season; size and quality of grits is discussed.

Food Habits: White-tailed deer

Anon. Food habits of Minnesota deer, Lake States Forest Expt. Sta. (St. Paul, Minn.) Technical Notes, No. 133, 1 p., Feb. 1938.

Examination of stomachs revealed 45 plant species eaten in fall and only 25 in winter. Conifers formed about one-fourth of the fall diet and three-fourths of that of winter. The species are named. General conclusions of the study are: "(1) That the winter carrying-capacity for deer in northeastern Minnesota is on the decline; (2) the browse species that form the greater part of the winter food are not of the greatest nutritional value; (3) many of the choice browse species are either characteristically rare or are becoming unattainable due to heavy browsing in previous years; (4) balsam fir, which may be good deer browse when eaten in moderate amounts in combination with more nutritious foods, is not capable of maintaining good health when eaten alone or in too great a proportion to other foods; (5) maple brush is the most generally available of the choice browse species in this area. Other desirable species may be abundant locally but are more spotty in their distribution; (6) the variation in the availability of certain browse species in different concentration areas indicates that management practices will have to be developed for and applied to rather limited areas."

Introductions: Chukar partridge

True, Gordon H., Jr. The chukar partridge of Asia, California Fish and Game (Ferry Bldg., San Francisco, Calif., 25 cents a copy), 23(3), July 1937, pp. 229-231, fig. 37.

The chukar (Alectoris graeca chukar) is one of 22 subspecies of a species that ranges from southern Europe to Arabia, India, and Mongolia. Birds introduced into California came from India. Description of the bird, its native habitat, and life history. Chukars have been liberated in 26 counties since 1932.

Life Histories: Ducks

Williams, Cecil S., and William H. Marshall. Duck nesting studies, Bear River Migratory Bird Refuge, Utah, 1937, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(2), April 1938, pp. 29-48, 6 figs., 4 pls., 10 tables.

Report on a study of 2,410 nests of nine species of wild ducks, including discussion of their distribution according to types of cover, location with reference to channels, and height above the soil. The closeness of approach of human observers permitted before the birds flushed from their nests is analyzed from 2,720 records. Size of clutches and fate of eggs also are discussed. The results are summarized in graphs and tables, the latter containing a wealth of detail.

Life Histories: Gray squirrel

Chapman, Floyd B. A summary of the Ohio gray squirrel investigation, Ohio Wildlife Research Station (Ohio State University, Columbus), Release No. 71, 7 pp., 4 tables, mimeographed, Feb. 1938.

Reports of progress in this investigation have been abstracted in WILDLIFE REVIEW Nos.: 4, June 1936, p. 15; 5, Sept. 1936, p. 19; and 13, March 1938, pp. 13-14; they dealt largely with regulated hunting and with information derived from interviewing hunters and inspecting their kill. The present paper summarizes data on: weights by age and sex classes, sex ratios by years, age classes, dens and leaf nests, courtship and mating, and parasites and diseases. The results of population studies indicate a cycle of about 5 years; estimates are given of the numbers of squirrels for different areas and years. Sixteen management recommendations are presented. Bibliography of 12 titles.

Life Histories: Red deer

Darling, F. Fraser. A herd of red deer (Oxford University Press, Oxford, England, 15 shillings a copy), 215 pp., 7 pls., 10 figs., 4 maps, 1937.

This book should be required reading in our wildlife management curricula at least until there is a work to equal it on some American animal. It is thorough and well written--in parts beautifully so. It shows the very great advantage of living with the objects of study--the indispensability of research in the field. It is evident that these things yielded the writer not only factual rewards but also the ultimate satisfaction all naturalists crave but few realize--of living in and as a part of nature. Among the red deer, he wrote "I have had the best of it--the love of them, neither wish nor necessity to do them harm, and a long time to watch through all seasons of the year." Technique and equipment are usefully described--the author found he could do stalking best when barefoot--the whole threshold of awareness was raised. Territory and population are treated under the divisions of winter, summer, and breeding territories; deer paths, wallows, and rubbing trees, and the social groups of hinds, stags, and harems. The social organization is matriarchal; hinds, not stags, are the leaders of family groups, of which the stags are only temporary members. Voice and play are described and general sociality discussed and to some extent compared with that of the roe deer and feral goats and sheep. There are chapters on movement as influenced by meteorological factors, insects, and food supply. Reproduction is treated in detail and the senses are discussed and appraised. Theoretical considerations receive attention throughout. There is a glossary of Gaelic place names, a succinctly annotated bibliography extending over 5-1/2 pages, and a good index.

Life Histories: Snowshoe hare

Criddle, Stuart. A study of the snowshoe rabbit, Canadian Field-Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 52(3), March 1938, pp. 31-40, 1 table, 1 graph.

The paper relates to Lepus a. phaeonotus, the common rabbit of deciduous and mixed forests of southern Manitoba. There are notes on pelage, measurements, and weights; on runways and the animal's work in clearing them, and on the use of holes; on sexual activities, the behavior of mothers and young, and on natural increase. There is nothing to indicate variation in birth rate in different phases of the cycle. A graph shows the course of a cycle, with peaks in 1922-23 and 1933-34. Food is discussed in some detail in separate sections for summer and winter. Migratory movements have been observed but normally the animals are localized and well-acquainted with their territories. Dusting and swimming, and diseases and predators, also are discussed.

Life Histories: Weights of birds

Nice, Margaret M. The biological significance of bird weights, Bird-Banding (Charles B. Floyd, 210 South St., Boston, Mass., 75 cents a copy), 9(1), Jan. 1938, pp. 1-11, 2 tables.

A report combining original and previously published data chiefly on small birds. Daily and seasonal fluctuations in weight are tabulated and discussed. Attention is given also to weight in relation to sex, age, and locality, and the weight of food in percentage of that of the bird. The author's summary is: "(1) Weight was found to fluctuate from 4.6 to 10.8 per cent throughout the day; (2) as a rule spring weight exceeded fall weight, while winter weight was highest of all; (3) weighings of White-throated Sparrows showed that in the mild fall of 1931 the birds averaged lighter than in the cold fall of 1932; that in 1931 birds that stayed from 5 to 26 days at Columbus failed to gain weight, and that later fall migrants were heavier than earlier migrants; (4) many species gain weight in winter, but some do not; (5) weight in the breeding season fluctuates considerably; the female increases markedly while laying eggs, and both parents lose weight while feeding young; (6) in many species the males are heavier than the females; in native sparrows captured in Columbus the female averaged from 88 to 95 per cent as heavy as the male, in Cowbirds 76 per cent; (7) immature birds often weigh less than adults; (8) more food is eaten in cold weather than in warm; (9) relatively more food is needed by a small bird than a large one."

There is a bibliography of 40 titles.

Management: Barberry eradication

Matheny, G. E. Plant blight campaigners find native barberry of little value to wildlife as food or cover, Virginia Wildlife (Blacksburg, Va.), 1(8), pp. 2, 6, 2 figs.

Because they are carriers of grain rusts, barberries are eradicated and it is estimated that more than 84 million of these plants have been destroyed in 9 counties of southwestern Virginia since April 1934. The justification named for removing the bushes is perhaps sufficient, but the statement that removal of so many plants is not detrimental to wildlife is subject to debate. It is said that the field workers report not once having seen game birds or animals using native barberry for food or cover--but could not this remark hav

been made just as well of any of scores of other plants? The observers were not engaged primarily in wildlife studies and may have paid very little attention, indeed, to the subject. It is said that barberry bushes are so dense and thorny that they do not afford suitable cover for wildlife. The general impression is that those qualities are what make good cover. Hosley lists (Proc. N. A. Wildlife Conference, 1936, p. 579) barberry among the 45 more important northeastern woody plants used by wildlife, and notes the ruffed grouse, pheasant, cottontail, and song birds as its patrons. The Biological Survey has found barberries in the stomachs of 12 species of birds and the article here commented upon notes their value to small rodents. That essay further notes that barberry, being sought during periods of snow and ice, is at best a starvation ration. The principle on which this conclusion is based is not one to follow too implicitly, for late hanging fruits are most desirable in the wildlife menu and any ration is better than none in a starvation period. It would seem that some fruits improve in edibility through exposure to winter, and among them may be placed barberries, and fruits of holly, privet, and bush honeysuckle. All of these are sometimes devoured in quantity in late winter and early spring.

Management: Bobwhite in New Jersey

MacNamara, L. G. Bobwhite development of the Glassboro public shooting grounds, New Jersey Fish and Game Commission (Trenton), 10 pp., 4 maps, tables, mimeographed, April 1938.

The proportion of New Jersey available for hunting is limited but the Game Commission is acquiring and developing areas, particularly in the southern part of the State. The soils and natural vegetation of two of these are described. Development chiefly consisting of the clearing and planting of food patches is described and its cost in man-days recorded. The plants used were sorghums, millets, soybeans, cowpeas, buckwheat, vetch, rape, and flax. The quail spent much of their time in the food patches, in part apparently for their cover value. The tracts had some native quail and others were added. Hunting was prevented in 1936 but permitted in 1937. Counts before and after the shooting season revealed a reduction in the number of quail by about 53 percent.

Management: Farm game

Tubbs, Farley. Farm crops versus game, Michigan Conservation (State Dept. of Conservation, State Office Bldg., Lansing, Mich.), 7(7), March 1938, pp. 6-7, 3 photos.

Management of crops so as to favor wildlife by maintenance of cover; use of flushing bar in mowing; harvesting practices; fence row planting; caution in drainage. Part of the author's concluding remarks are: "It is suggested that farmers who wish to increase the game or wildlife on their lands do two things. (1) List all agricultural activities which tend to reduce the wildlife supply, and (2) substitute wherever possible economically and biologically sound agricultural practices which are conducive to a good supply of desirable wildlife species. x x x It is believed that the general adoption of sound cultural land

and stock management practices, which are favorable to wildlife, will produce more game than all the specific measures sportsmen and conservationists can entice the landowner to employ."

Management: Farmer-sportsman relationship

Anon. Fee shooting? Virginia Wildlife (Blacksburg, Va.), 1(4), Dec. 1937, p. 4.

Wildlife management is what is wanted, and that requires time, effort, and expenditure on the part of the farmer. Considering existing burdens, he can hardly be expected to do what is needed without compensation. The friendship approach to hunting privileges will leave many sportsmen unprovided for, because there are not enough farmers to go around.

Management: Feed patches

Allen, Durward L. Some observations on fall and winter food patches for birds in southern Michigan, Wilson Bulletin (Sioux City, Iowa, 60 cents a copy), 50(1), March 1938, pp. 42-46.

A good "food patch plant must provide an adequate and readily available supply of acceptable grain at the time when other foods are most scarce." The Williamston food patch mixture (for which formula is given) was sown in a variety of sites. Response of the plants and their utilization by birds are described. The plants grew well and were productive only on good soils and with ample rainfall. Most of the grain was consumed by song birds in fall. For that reason and because of lodging, the only seed available during periods of deep snow was hemp. Standing corn is the only dependable food supply through the winter. The value of weeds is discussed. There is a bibliography of 6 titles.

Management: Forest wildlife

Fitzgerald, O. A. Feud on the ranges, Country Gentleman (Curtis Publishing Co., Philadelphia, Pa., 5 cents a copy), 108(4), April 1938, pp. 15, 103-104, 1 photo.

Discussion of the charge that grazing by livestock is injurious to wildlife on the National Forests. The real limiting factor is winter range and it cannot be modified except by acquisition of lands outside the present boundaries of the Forests. It is not likely that sufficient winter range to match available summer range will ever be obtained so herds must be regulated. Keeping livestock away from spots frequented by recreationists might contribute to harmony, and grazing should be avoided in important upland game-bird range during the nesting season. The "biologist and game scientist," that is the wildlife manager, probably is in best position to mediate between the sportsmen and stockmen.

Management: Harvesting fox squirrels

Baumgartner, Luther L. A survey of the 1937 fox squirrel harvest in 27 Ohio counties, Ohio Wildlife Research Station (Ohio State University, Columbus), Release 69, 8 pp., 7 tables, mimeographed, Dec. 1937.

Author's synopsis: "Intent upon developing a more accurate method of invoicing the annual Ohio harvest of Fox Squirrels, a hunters' census was attempted during the 1937 squirrel hunting season. In 27 counties in the northern two-thirds of Ohio, 12 men cooperating interviewed about 500 squirrel hunters.

"From the census cards it was found that the average hunter spent 3.45 days hunting and bagged an average of 3.47 squirrels. For every 100 squirrels killed, 5.2 squirrels were crippled. In popularity the 12 gauge ranked first, the .22 caliber rifle second, with the 16 gauge, 20 gauge, and 410 gauge ranking third, fourth, and fifth, respectively. Slightly more than 50% of the hunters who were successful bagged from one to two squirrels, 25% from three to four, 15% from five to eight, and the remaining 10% killed from nine to twenty-two squirrels per hunter.

"About 97% of the hunters utilized less than two-thirds of the season, with but 3% using the entire season. A conservative calculation reveals that there were 51,000 squirrel hunters in the 27 counties sampled, of which 750 were gray squirrel hunters. These hunters killed approximately 174,000 squirrels. The sex ratio for all Fox Squirrels handled was reported as 55.66% males, 44.34% females."

Trial of a mail questionnaire resulted in failure.

Management: Miscellaneous

Anon. Wildlife Management in North Carolina (Division of Game and Inland Fisheries, Raleigh, N. Car.), 15 pp., 4 figs. (photos), March 1938.

This issue contains an article dealing with the farmer-sportsman relationship signed by Rupert E. West. Several notes relate to food habits: crow and quail eating poison ivy fruits; quail feeding heavily on pokeberries; wild turkey on flowering dogwood fruits; cottontail on Lespedeza sericea. Suggestions as to planting this legume. Cultivated species of Crotalaria are are not recommended for game plantings. The availability of old tobacco seed patches for wildlife feed patches is pointed out and recommendations made of what to plant.

Management: Miscellaneous

Anon. North Carolina Wildlife Conservation (Division of Game and Inland Fisheries, Raleigh, N. Car.), 2(4), April 1938, 14 pp., 2 photos, 1 fig.

Account of a large robin roost and efforts to protect the birds; droppings indicated feeding on dogwood and holly berries; illegality of molesting

fawns, cubs, and other immature wildlife; analyses of 23 quail crops from Randolph County, most important foods lespedeza and cowpea seeds; instances of the benefits of management for farm wildlife.

Management: Planning

Adams, Chas. C. The relation of the natural resources to regional and county planning, New York State Museum (Albany, N. Y.) Bul. 310, pp. 121-141, figs. 33-34, 45-47, 1937.

The section (pp. 129-131) devoted to plants and animals notes that it is difficult to make use of information which is not clearly expressed in maps. This indicates the need of much ecological surveying. Native vegetation often shows the best general use of land because it is the result of Nature's prolonged experiments with plant growth on the various sites. It is desirable to combine policies for plants and animals because they are so closely related. These natural resources require careful professional and technical study as a prerequisite to formulating and executing sound public policies for their care and utilization. Bibliography of 55 titles.

Management: Planting, black locust

Meginnis, H. G. Effect of depth of sowing on nursery yields of black locust, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 36(4), April 1938, pp. 411-416, 1 fig., 1 table.

Fuller account of the work reported under same title in January 1938 (abstract in WILDLIFE REVIEW, No. 11, Feb. 1938, p. 27). Seed should be covered 1/4 to 1/2 inch in a carefully prepared seedbed. Bibliography of 6 titles.

Management: Planting coverts

Anon. Covert planting for pheasants, I. C. I. Game Researches (Imperial Chemical Industries, Millbank, London, England) Advisory Leaflet 15, 12 pp., Jan. 1938.

Forestry characterized by small block cuttings and plantings and the leaving of marginal clear belts, is entirely compatible with satisfactory pheasant production. The suggestions given in this leaflet are for shooting estates and relate to the points of a good covert, construction of a covert, rides, flushing points, selection of trees, marginal cover of both trees and shrubs, nesting sites, and water. There are notes on protecting coverts against rabbits, in part by the use of plants not attractive to those animals. An appendix gives the numbers of trees required to plant an acre at various spacings and also planting distances for hedge plants.

Management: Planting, rooting of softwood cuttings

Ure, C. R. Preliminary tests with softwood cuttings of trees and shrubs in Alberta, Scientific Agriculture (1005 Confederation Bldg., Ottawa, Canada), 17(12), Aug. 1937, pp. 720-726, 2 figs., 3 tables.

Report on trials of numerous species, a good proportion of which are of value to wildlife, giving results as to different media, bottom heat, place of basal cut, and stage of maturity in relation to rooting.

Management: Range

Mollin, F. E. If and when it rains, American National Live Stock Association (515 Cooper Bldg., Denver, Colo.), iv+60 pp., illus., 1938.

As the subtitle states, this pamphlet presents "The stockman's view of the range question." The message in general is that the drouth cycle has been made the pretext for exaggerated criticism of range use. There is a section (pp. 46-49) on wildlife which contends "that it is entirely practical to graze wild life and domestic live stock on the same areas in reasonable numbers," and that big game has been steadily increasing on National Forests despite grazing. The introduction points out that many ranchers have gone to great lengths to conserve wildlife and claims that "in many areas many varieties of game would today be extinct except for the protection provided by stockmen."

Management: Range bibliography

Renner, F. G., et al. A selected bibliography on management of western ranges, livestock, and wildlife, U. S. Dept. Agr. Miscellaneous Pub. (Supt. of Documents, Washington, D. C., 45 cents a copy)/ 468 pp., March 1938. 281,

The wildlife section is by no means restricted to western range entries and is the most extensive bibliography of American wildlife management yet published. There is an author index.

Management: Seed treatment

Hargrave, P. D. Seed germination of the saskatoon and pincherry, Scientific Agriculture (1005 Confederation Bldg., Ottawa, Canada), 17(12), Aug. 1937, pp. 736-739, 1 table.

Results from 3 types of after-ripening and the time required; temperatures at which after-ripening and germination occurred. Bibliography of 6 titles.

Management: Stocking chukar partridge

Bade, August. The chukar partridge in California, California Fish and Game (Ferry Bldg., San Francisco, Calif., 25 cents a copy), 23(3), July 1937, pp. 233-236, figs. 38-39.

Presents apparently the same material as the paper of same title abstracted in WILDLIFE REVIEW, No. 12, February 1938, p. 19.

Pollution: Destruction by oil

Aldrich, Elmer C. A recent oil-pollution and its effect on the water-birds of the San Francisco Bay area, Bird-Lore (National Association of Audubon Societies, 1775 Broadway, New York, N. Y., 30 cents a copy), 40(2), March-April 1938, pp. 110-114, 3 photos.

Wrecking of a tanker in the Golden Gate resulted in oil spreading far and wide--10-1/2 miles in one day. Lists of species of birds and number of individuals found on four measured lengths of beach--in all 269 to 5-1/2 miles.

Predators: Fire ant

Emlen, John T., Jr. Fire ants attacking California quail chicks, The Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif., 50 cents a copy), 40(2), March-April 1938, pp. 85-86.

Record of a case of attack of Solenopsis xyloni on hatching eggs; nest protected by a ring of sodium fluoride and pyrethrum.

Propagation: Artificial incubation

Romanoff, Alexis L. Study of artificial incubation of game birds. III Effect of air movement on the incubation of pheasant and quail eggs. IV Interrelation of temperature, humidity, and air movement in the incubation of pheasant and quail eggs. Cornell University Agr. Expt. Sta. (Ithaca, N. Y.) Bul. 687, 30 pp., 11 figs., 11 tables, March 1938.

Careful research in methods of improving artificial incubation. Embryonic mortality, hatchability of eggs, and condition of hatched birds as affected by variations in temperature, humidity, and air movement are discussed in detail. Sectional summaries are:

"(1) In general, the pheasant eggs are less sensitive, both to a high rate of movement of air and to a great difference in temperature between the top and the bottom of the egg, than are the quail eggs; (2) both pheasant and quail eggs are sensitive to a high rate of movement of air during the latter part of incubation, and to a great difference in temperature between the top and the bottom of the egg during the early part of incubation; (3) the high rate of movement of air in the incubator up to 5 miles per hour is undesirable for pheasant eggs and disastrous for quail eggs during the latter part of incubation; (4) the great difference in temperature between the top and the bottom of the egg, up to 5° F. for every inch of elevation, is not desirable for pheasant eggs and is disastrous for quail eggs during the early part of incubation; (5) in the practice of artificial incubation of pheasant eggs, it would seem advantageous to incubate them in an agitated-air type of incubator and then transfer them for hatching into an incubator of the still-air type; (6) in the practice of artificial incubation of quail eggs, it would seem advantageous to both incubate and hatch them in a slow-agitated-air type of incubator."

"(1) There is a definite, yet specific-to-species, relationship among the three important physical factors of incubation--temperature, humidity, and

air movement; (2) there should be a proper adjustment of incubation conditions in respect to temperature and humidity according to the rate of air movement in the incubator; (3) the proper adjustment of temperature and humidity allows the more extensive use of agitated-air-type incubators for greater efficiency of operation in the hatching of pheasant and quail eggs; (4) pheasant eggs that have been incubated for the first 20 days in an agitated-air-type incubator may thereafter be hatched most successfully in a still-air-type incubator with a slightly lowered temperature (about 0.5° F. lower) and relative humidity (about 3 to 5 per cent lower) from the average conditions recommended for the type of incubator for continuous incubation and hatching; (5) quail eggs may be incubated and hatched most successfully in an agitated-air-type incubator, provided that with an increase of air movement there is a corresponding increase in both temperature (up to 0.25° F. higher) and relative humidity (about 2 to 3 per cent higher)."

Propagation: Artificial incubation

Romanoff, Alexis L., Gardiner Bump, and Earl Holm. Artificial incubation of some upland game birds' eggs, New York State Conservation Dept. (Albany) and New York State College of Agriculture (Ithaca) Joint Bul. 2, 44 pp., 2 pls., 3 figs., 4 graphs, 12 tables, Jan. 1938.

Report on thorough scientific investigation of the requirments for the most successful artificial incubation of the eggs of the ring-necked pheasant, bobwhite, and ruffed grouse. Some of the important subdivisions of the treatment are: nature and characteristics of birds' eggs, normal development of the embryo, temperature requirements, effects of air movement, interrelation of temperature, humidity, and air movement, and other factors of incubation. Specific recommendations for the management of incubators for each species are given in tabular form, and there are practical suggestions on selection, care, and shipment of eggs, choice, preparation, and management of incubators, handling of hatch, and computing weight loss of eggs. References are given to 9 pertinent papers by the authors and associates, and there is a 2-page general bibliography of works on the propagation of pheasants, grouse, and quail. General conclusions are:

"(1) The average normal temperature for the incubation of pheasant, grouse and quail eggs is (1) in an agitated air type incubator about 99-1/2° F and (2) in a still air type incubator from 101-1/2° to 103-1/2° for the pheasants and from 102° F to 104° F for grouse and quail eggs, depending upon the make of incubator; (2) at a constant humidity and air movement, pheasant eggs require higher temperature at the beginning and lower temperature at the end of incubation, perhaps as much as 2° F difference; (3) at a constant humidity and air movement, quail and grouse eggs require almost constant or even slightly raised temperature towards the end of incubation or about one-half degree F; (4) the average normal relative humidity for the incubation of pheasant, grouse and quail eggs, in either agitated air or still air type incubators is about 65 per cent; (5) pheasant eggs develop best if exposed to a higher humidity at the beginning and a lower one at the end of incubation. The reduction should be from about 70 per cent relative humidity to 60 per cent; (6) quail eggs require somewhat lower humidity at the beginning and higher at

the end of incubation, that is, rising from 60 per cent relative humidity to 70 per cent; (7) in practice it is usually best to incubate pheasant eggs in an agitated air type incubator then on the twentieth day to transfer for hatching into a still air type; (8) in practice it seems advantageous to incubate and to hatch quail eggs in a slow agitated air type incubator; (9) pheasant eggs that have been incubated for the first twenty days in an agitated air type incubator may thereafter be hatched most successfully in a still air type incubator with a slightly lower temperature (about one-half degree F) and lowered relative humidity (about 3-5%) from the average conditions recommended for the type of incubator where continuous hatching is practiced; (10) quail eggs may be incubated and hatched most successfully in an agitated air type incubator, provided that with an increase of air movement there is a corresponding increase in both temperature (up to one-quarter degree F) and relative humidity (about 2-3%); (11) the rate of exchange of oxygen and carbon dioxide is in proportion to the size of the embryo. Very little fresh air is needed at the beginning of incubation. However, it should be increased to an abundant supply at the time of hatching; (12) pheasant, grouse or quail eggs should be incubated preferably in their natural position, that is, horizontally though they can be hatched successfully in a vertical position--blunt end up; (13) turning from two to four times daily from the beginning up to the 20th day of incubation of pheasant, grouse and quail eggs should be sufficient."

Propagation: Cover in pens

Sedley, Henry. Cover for game birds in pens, Modern Game Breeding and Hunting Club News (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 8(4), April 1938, p. 4.

Sheds, brush piles, and growing plants, including weeds, elephant grass, Cotoneaster, Lantana, and conifers.

Research: Feather-marking grouse

Edminster, Frank C. The marking of ruffed grouse for field identification, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(2), April 1938, pp. 55-57.

Reference to a variety of methods tested, of which only belling and feather-marking proved satisfactory and the former method to only a limited degree. The technics of dyeing white poultry retrices, fastening them to the stumps of tail feathers of the grouse, and grouping them in identifying combinations are described. There are notes also on marking by cutting tail feathers, and on the method of use of cat-bells.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-106. Report on extension work in wildlife conservation to December 1937, by I. T. Bode [abstracted by Leo K. Couch], 7 pp., March 1938.

General interest in wildlife conservation; needs for wildlife extension program; requirements for informational material; work accomplished and plans for 1938; suggestions for continuation program. Much the same material as in papers by Bode abstracted in WILDLIFE REVIEW, No. 12, Feb. 1938, p. 11, and No. 13, March 1938, pp. 12-13.

BS-107. Planning for wildlife management--an outline, 5 pp., March 1938.

Outline of things that should be considered while making a plan for wildlife management; survey of resources, including condition of existing habitat, present wildlife population, and limiting factors; management objectives, as to formulate and correlate plans for better land utilization, to insure permanence of basic resources, to produce optimum conditions for wildlife, to assure proper utilization of wildlife, to assure protection of personal and property rights, and to provide returns to the community and to individuals; and suggestions as to sources of supplemental information.

BS-108. History and significance of American wildlife, by H. P. Sheldon, 8 pp., March 1938.

Prepared for use in schools, this leaflet is organized under the following heads: original wealth in wildlife, abundance unimpaired by Indians, exploitation by white men, influence of wildlife on colonization and settlement, early traffic in wildlife and its products, exploitation era closing; wildlife management the remedy; restoration a land-use problem.

SPECIAL ARTICLE

Wildlife research programs (continued)

RESEARCH BY COLLEGES AND UNIVERSITIES

California, College of Agriculture (Davis).--"Biology of Valley Quail on farm lands. Seasonal cycle, nesting, food, cover requirements, causes of loss, effects of cultivation and other farm practices. Studies on University Farm at Davis by J. T. Emlen, Jr., two and one-third years.

"Valley Quail biology on foothill range lands (cooperative under U. S. Forest Service, California Forest & Range Experiment Station, U. S. Biological Survey, and Division of Zoology, U. C.). Details as in preceding but with

special attention to effect of wild rodents and grazing live stock. At San Joaquin Experimental Range about twenty-five miles east of Madera by Ben Glading, eight months.

"Birds in relation to almonds. Nature and extent of depredations by crows, California jays, California woodpeckers and flickers. Varietal preferences, means of overcoming difficulties. University Farm at Davis by J. T. Emlen, Jr., three summer seasons. Preliminary account in The Condor, Vol. 39, 1937, pp. 192-197.

"The muskrat as an alien in California and Europe. Economic status in areas where native, history of introductions and of spread, control measures and their success. T. I. Storer, Report in Journal of Mammalogy, 18(4), Nov. 1937, pp. 443-460.

"Age estimation in California deer. Examination and appraisal of criteri Limitations in use of antler characteristics; estimates of age based on tooth-eruption sequence and tooth wear as reflected in collections of deer killed by hunters during open season. T. I. Storer in cooperation with California Regional Office of U. S. Forest Service, two years.

"Biology of rodents and fleas in relation to plague (cooperative study with California State Board of Public Health, Hooper Foundation for Medical Research, and Divisions of Entomology and of Zoology, U. C.). Species involved ecologic distribution, population, density before and after rodent control; density and species composition of flea fauna, Fletcher G. Palmer, four months. (Tracy I. Storer, Professor of Zoology, Sept. 22, 1937.)

Cornell University (Ithaca, N. Y.), Laboratory of Animal Nutrition.--"This laboratory concerns itself with problems of animal nutrition and physiology using the term animal in its broadest sense. From this standpoint w have carried on from time to time research with various species other than the domestic animals or man.

"In order to provide knowledge which would enable us to decrease the losses by starvation of deer in this state, we have carried on investigations o the nutritive requirements of this species and devised a supplementary food capable of being taken into the wild for consumption by deer during the winter months. The results of this study have found practical application in this state and elsewhere. So far as I know they represent the first metabolism studies of their kind which have been done with deer.

"We have also studied the digestibility of various foods for mink and made certain observations on their metabolism. We have shown that mink digest proteins and fats better than they assimilate carbohydrates; that they digest cooked carbohydrates better than uncooked; and, that the partial substitution of dried meat for fresh meat in the ration lowers its digestibility. We have also obtained a considerable number of data on the constituents of mink urine and the possible relation of diets to them. I have no report for distribution on this work but I expect a report will shortly be published in the American Fur Breeder.

"The few experiments which we have carried on have convinced us of the great need of the application to wild life research of the same fundamental techniques which have been employed in studying the nutritional physiology of man and the domestic animals. It has been our experience, however, that it is very difficult to interest in this kind of work the agencies who are primarily responsible for the support and policies with reference to the propagation and conservation of wild life." (L. A. Maynard, Professor of Animal Husbandry, Sept. 27, 1937.)

Idaho, University of (Moscow).--"The School of forestry at the University of Idaho began a modest research program on wildlife in the fall of 1936 when Dr. A. B. Hatch took over instruction in Game Management. As yet no projects have been completed.

"The studies so far are confined to introduced upland game birds in the farming country immediately surrounding Moscow and to the big game of the Selway-Bitterroot Primitive Area and vicinity.

"The bird studies seek to answer two questions: (1) the environmental (including hunting, both legal & illegal) factors which limit the increase of ring-neck pheasants and Hungarian partridges in the vicinity of Moscow, and (2) the role of these birds in destroying or disseminating weed seeds.

"Areas aggregating about 5,000 acres (on and off of game preserves) have been selected for intensive study. Cover maps were prepared and during five half-days of each week data are collected on the whole area on the life histories of all wildlife. Forty-five seniors in the School of Forestry are doing the field work. Additional information is being collected by Dr. Hatch and a graduate student on the birds seen and bagged by Moscow's five-hundred licensed hunters. By arrangement with the State Game Department, all birds released in the region are tagged.

"The weed seed study has yielded rather extensive data showing that with one exception all weed seeds of the region are destroyed in passing through pheasants. Because of conflicting evidence obtained elsewhere, the study is being continued, only birds being used which have been trapped from the wild and these retained in captivity no longer than the duration of one forced feeding experiment.

"The big game studies are being carried out jointly with the U. S. Forest Service. They include winter game census studies and experiments on improving the badly overgrazed winter range of elk and deer in the Selway. Some thirty-three acres of this range has been fertilized with various quantities of nitrogen (see Mitchell, H. L., and Hosley, N. W., 1936, Differential browsing by deer on plots variously fertilized. Black Rock Forest Papers 1 (No. 5): 24-27) and the growth, sugar and nitrogen content and palatability to game of the browse on these plots are being investigated." (D. S. Jeffers, Dean, School of Forestry, Nov. 12, 1937.)

Michigan State College of Agriculture and Applied Science (East Lansing).--"Associate Professor J. W. Stack and his advanced students have for years been cooperating with the Biological Survey by banding song birds on and near the

Campus of Michigan State College. Thirteen or fourteen thousand individuals have been banded and the results reported to the Biological Survey.

"Mr. Durward L. Allen has just completed a comprehensive ecological study of the W. K. Kellogg farm, forestry, and bird sanctuary area near Battle Creek. The interrelationships of the mammalian and avian faunae were quite extensively investigated in this study which extended over a couple of years. The results are to be published before long.

"Mr. Carl Gower has just finished an extensive investigation of the animal parasites in ducks at the W. K. Kellogg Bird Sanctuary. We expect that his results will be published as a bulletin by the Michigan Agricultural Experiment Station.

"George B. Becker, who is now an employee of the Federal Soil Conservation Service in North Carolina, carried out a study some years ago on weights and temperatures in song birds. Professor Stack intends to publish the results soon

"We have been experimenting, in a more or less hit and miss fashion, on breeding and raising beavers in small enclosures. We have succeeded in getting one pair to breed several times, but we are not satisfied that we have solved the main problems of beaver culture under these conditions. We intend to pursue the matter further.

"Other projects have occurred to us, or have been attacked with varying degrees of success. The one thing I have attempted to study is the inheritance of grey versus black in fox squirrels, but after several years I succeeded in getting only one pair to breed in captivity. Mr. Ostenson has been interested in the control of mice which in winters of deep snow eat the bark on fruit trees." (H. R. Hunt, Head of the Department of Zoology, Sept. 24, 1937.)

Michigan, University of (Ann Arbor).--

Department of Zoology

A. E. Woodhead and graduate students
The life history of Dioctophyme renale, the giant kidney worm of mink.

E. L. Cheatum
The life history of Leuchloridium parasites of marsh birds.

Lowell Woodbury
A statistical study of Clinostomum and other parasites as affecting the growth of fishes.

Division of Mammals, Museum of Zoology, and
Laboratory of Vertebrate Genetics

Lee R. Dice
Experiments on methods for taking censuses of small mammals; relation of geographic races and local varieties to environmental conditions; inherited variations in wild rodents; fertility relations of races and species; classification of biotic provinces and districts of North America.

W. H. Burt
Studies of home ranges and individual wanderings of small mammals; rate of multiplication and population densities of small mammals in southern Michigan.

A. J. Nicholson
Homes of small mammals in southern Michigan; life history of the fox squirrel in southern Michigan.

W. Frank Blair
Ecological communities western Oklahoma and of the Davis Mountain region of Texas.

Don Hayne
Metabolic rates of native small mammals.

School of Forestry and Conservation

E. C. O'Roke
Progressive loss of the protozoan parasite of ducks (Leucocytozoon anatis) as normal recovery of the host takes place; lungworms in deer. Several lines of investigation dealing with distribution, pathology, ecology, and life history; Fasciolopsis magnum, the large liver fluke of deer, in a herd of deer in a fenced inclosure; recovery of Scotch pine following rabbit injuries, continued studies now in the seventh year; overlapping interests of wildlife and domestic animals, part of a comprehensive study dealing with land utilization in Cheboygan County, Michigan.

H. M. Wight
An inventory of the wildlife resources of Washtenaw County, Michigan; the effect of certain forestry practices on wildlife (in cooperation with the U. S. Forest Service on the Huron National Forest); a method of evaluating a forest wildlife environment quantitatively.

S. A. Graham
Development of a research and demonstration area to cover the major environments in a typical mixed forest in the Lake States region.

Neil Hosley
An investigation of the woody plants as wildlife management materials.

W. H. Long
A quantitative study of the effects of wildlife management practices on song birds; the physiology of game birds, laboratory metabolism studies made by means of precision apparatus with certain factors controlled and measurable; a comparative study of the metabolism and activity of different strains of wild turkeys (in cooperation with the Pennsylvania State Game Commission).

Henry Mosby
The basic factors underlying the past and present distribution of the wild turkey; factors affecting the distribution and abundance of the wild turkey in Virginia.

O. H. Clark
The correlation of wildlife management and other land uses. An area study based upon field work in Emmet County, Michigan.

F. C. Goble
The normal histology of the white-tailed deer; the histopathology of the white-tailed deer, with particular reference to lungworm infections.

J. P. Johnston
The distribution of livestock-poisoning plants in Michigan (later studies are contemplated to ascertain whether any of these plants are poisonous to deer).

A. B. Hovey
A method of evaluating waterfowl environment in southern Michigan. A comparative study of several lakes.

C. E. MacGregor
A game management plan for Northville Township, Washtenaw County, Michigan

C. S. Miller
Factors affecting the distribution and abundance of ruffed grouse in southern Michigan.

B. A. Bateman
Coordinating wildlife management with timber management on southern forests. (Timber management plans have already been developed for the areas to be considered in this study.)

George Kelker
Wildlife population studies, emphasizing the use of mathematics.

Wm. Marshall
Population studies of fur-bearing animals.

W. T. Early
The carrying capacity of deer yards.

Samuel D. Knox
The conservation of birds of prey.

Irwin Sturgis
A life history study of the mourning dove; a key for identifying bird feathers.

H. A. Mathiak
Development of a key for identifying hair and fur.
(S. T. Dana, Dean, School of Forestry and Conservation, Oct. 8, 1937.)

Wisconsin, University of (Madison).--

Hungarian Partridge Study. A. S. Hawkins. Nesting, population levels, feeding. Faville Grove Area.

Prairie Chicken Study. F. N. Hamerstrom, Jr. Banding. Physiology of budding. (Just starting; resumption of Schmidt study.)

Pheasant Movement Study. A. S. Hawkins (for 1937-38). Behavior of marked winter releases of trapped birds (1936-37). Behavior of marked resident birds (1937-38).

Foodpatch Study. Lyle Sowls. Offering various standing grains and following selection by observation and stomach analysis.

Feeding Study. A. S. Hawkins. Same, only shelled grains in trays and hoppers. (Completed.)

Horned Owl Pressure on Game Birds. Frances Hamerstrom. Pellet analysis and correlation with environment.

Spread of Hungarian Partridge in Wisconsin. Aldo Leopold. Historical.

Life History and Management of Desmodium. Lyle Sowls. Culture. Insect enemies. Yields per acre. Effects on density of grazing, burning, etc.

Ecological History of Faville Grove. A. S. Hawkins. History of local wildlife in terms of agricultural practice and ecological conditions.

Restoration of a Woodlot for Ruffed Grouse. Douglas E. Wade. Rebuilding a grazed-out woodlot by planting, then restocking.

Food and Cover Handbook. Douglas E. Wade. Compiling in popular form all available research findings on farm wildlife applicable to Wisconsin."
(Aldo Leopold, Professor of Game Management, Sept. 17, 1937.)

RESEARCH BY MISCELLANEOUS ESTABLISHMENTS

Cooperative Quail Study Association (Thomasville, Ga.).--

A. Food and Cover Experiments.
   1. Correlation of upland game management with agricultural and forestry practices. Native and exotic vegetations, and summer cover crops and winter cover crops that may have value to game.
   2. Controlled burning.
   3. Volunteer vegetations.
   4. New and desirable game and wildlife feeds, especially early spring seeders, of which we have a great need. Fall seeders. Experimental dove field plantings.

During the past year we have tested 106 species of plants at Sherwood Plantation. Those already known to be of value were planted in duplication to determine the best fertilization for practical use. (These studies are in cooperation with State and Federal Experiment Stations.)

B. Predation Studies. This year largely confined to relationship of native mammals to quail.
   1. Fox life history study with special emphasis on food habits during the breeding season of upland game, on ground where the game popula-

tions are roughly known. This study now going into third year.
2. Bobcat, skunk, opossum, and raccoon food habit studies. (In cooperation, especially with U. S. Bureau of Biological Survey.)
3. Cotton rat life history study.
4. Deer repellent study--electric fence, etc.

C. Comparison of Game Management Practices in Different Sections and on Different Soils of Southeast.

This consists of the gathering of information in the course of practical inspections on representative preserves in the Carolinas, Georgia, and Florida largely. Statistics as to kill and sex ratios are a byproduct of this work.

(Herbert L. Stoddard, Director, Cooperative Quail Study Association, Sept. 23, 1937.)

Roosevelt Wildlife Forest Experiment Station (Syracuse, N. Y.).--"The researches most recently completed by the Roosevelt Wildlife Forest Experiment Station are described in the latest two publications of the Station:

"Roosevelt Wildlife Bulletin, Vol. 6, no. 4. Preliminary reconnaissance of the land vertebrates of the Archer and Anna Huntington Wild Life Forest Station, by Charles E. Johnson; Preliminary reconnaissance of the waters of the Archer and Anna Huntington Wild Life Forest Station and their fish inhabitants, by Wilford A. Dence; published, January, 1937. This is an inventory of the vertebrate species occurring on the Huntington Forest, a 13,000-acre tract of typical Adirondack forest situated near Newcomb, New York, and deeded to Syracuse University in trust for the New York State College of Forestry, by Archer M. and Anna H. Huntington. It is to be used 'for investigation, experiment and research in relation to the habits, life histories, methods of propagation and management of fish, birds, game, food, and fur animals and as a forest for wild life.'

"Roosevelt Wildlife Bulletin, Vol. 7, no. 1. Effect of deer browsing on certain western Adirondack forest types, by John Pearce; published October, 1937. This deals with the measurement of the extent and effect of deer browsing on certain types of Adirondack forests, intended primarily to determine the effect of browsing on forest types and forest succession.

"Two other Station projects are completed and the results are being prepared for publication at this time. These are:

"Birds of the Northern Boundary of New York State, by A. Sidney Hyde. This is a comprehensive ornithological and ecological survey of the northern boundary of New York State, including work on various ecological areas, breeding activities, migrations, conservation, and other pertinent questions.

"Birds of the Catskill Mountains, by Charles J. Spiker. An ornithological survey of the Catskill Mountains.

"A current project on which much work has been accomplished is:

"Studies on small mammals by M. T. Townsend. This is a continuation of an extended investigation, the first part of which was published in the Roosevelt Wildlife Annals, Vol. 4, no. 1. Studies on some small mammals of central New York; December, 1935, by M. T. Townsend. The present study deals with populations, distribution, movements, local range, ecological relation, and experiments in methods of study of small mammals of various ecological associations and habitats.

"The Station's plans for research in the immediate future center very largely around the Huntington Forest. Two general types of research are planned

A. Investigations of: population fluctuations; seasonal distribution; seasonal, annual, and life-time ranges (cruising radius); rate of spread; preferences in the matters of foods and coverts according to species, sexes, age group, seasons, and activities; and certain phases of life histories of the species concerned.

B. Investigations of: the effects on wildlife of various kinds of forest management and silvicultural practices; and the response of wildlife to various wildlife management practices.

"The investigations will be of an intensive nature on a limited area rather than extensive and on scattered areas; they will attempt to correlate wildlife activities, reactions, and responses to the whole environment (undisturbed on that portion of the forest retained as a check area) and to controlled changes of the environment (on that portion of the forest where logging, silviculture, and planting will be practiced). The primary aim is to determine if possible how sound wildlife conservation through 'management' can be practiced in connection with sound timber management and to demonstrate the economic and biological feasibility of a sound forest management program that takes account of all the forest products." (Ralph T. King, Director, Oct. 11, 1937.)

NOTES AND NEWS

The National Park Service, Department of the Interior, Washington, D. C., has issued (mimeographed) an extensive Check-List of the Birds of the National Parks. The complete work is available in limited quantity from the address given and separates of the sections relating to the different Parks are in the hands of the administrators of those reservations. The lists include records by Park naturalists and from the literature and there is a bibliography of papers cited for each chapter. The publication is preliminary in character and was planned to elicit amplifying data from all having information on birds of the Parks. The volume is dated December 1937 but was distributed in April 1938 and is inscribed "not for publication".

The Iowa Agricultural Experiment Station (Ames) has published a booklet by Thomas G. Scott and George O. Hendrickson, entitled "Nesting birds of Iowa" (64 pp., illus., March 1938). It contains sections on attracting birds and on bird adaptations, illustrated, and accounts of 50 species, each of which includes a brief description, notes on habits, and competent line drawings of a pair or family group by Sid Horn. Mention is made of 15 other species and a short list of available publications is given.

A list of 12 species of birds seen feeding on mulberries (Morus alba) at Wood's Hole, Mass., by C. C. Purdum and F. P. Browne was printed in The Oologist, 19(2), Feb. 1902, p. 24. It contains the names of 3 species not included in the list of 63 given in WILDLIFE REVIEW, No. 10, Oct. 1937, p. 24, namely, the black and white, and black-throated green, warblers, and the ruby-throated hummingbird. The last named bird may feed on mulberries but rather precise observations should be made to settle the point. There might be other things about a fruiting mulberry tree attractive to hummingbirds--insect-secreted honeydew for instance.

Imperial Chemical Industries, Millbank, London, England, has issued another catalog of its publications on game researches, listing 14 Advisory Leaflets and 5 other booklets. Advisory Leaflet No. 15 is abstracted in the present issue of WILDLIFE REVIEW. The subjects of 7 proposed leaflets in this series also are given in the list cited. Announcement is made that the corporation has decided to continue game research for a further period (apparently of 5 years) as well as support of, and cooperation with, the Bureau of Animal Population. The cooperative program is outlined. It includes maintenance of a field station at which nutritional requirements and means of protecting game bird populations against diseases will be the principal objects of research.

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WILDLIFE REVIEW

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SPECIAL NOTICE

Requests for the publications abstracted, other than Wildlife Research and Management (BS) Leaflets, should be sent, not to the Biological Survey, but to the address given in the bibliographic citation to the particular paper desired.

Washington, D. C. No. 15 July, 1938

Biological Survey: Mt. McKinley National Park

Dixon, Joseph S. Birds and mammals of Mount McKinley National Park, Alaska, National Park Service, Fauna Series, 3 (Supt. of Documents, Washington, D. C., 35 cents a copy), xii+236 pp., 1 pl., 85 figs., 1938.

A beautifully illustrated faunal report of a high standard of excellence, treating 107 species of birds and 34 of mammals. The account of each species deals with identification, distribution, and life history. General matter in introductory pages relates to explorations of the area, the climate, faunal position, life zones, wildlife habitats, fluctuations in populations, and observational areas.

Classification: Ground squirrels

Howell, Arthur H. Revision of the North American ground squirrels, with a classification of the North American Sciuridae, U. S. Biological Survey, N. A. Fauna 56 (Supt. of Documents, Washington, D. C., 40 cents a copy), 256 pp., 32 pls. (11 col.), 20 figs., April 1938.

Habits and economic relations of 25 groups of ground squirrels. Classification of the N. A. Sciuridae including key to the genera and subgenera, further description of the characters, and citation of type species. Revision of the genus Citellus in 97 subspecies representing 31 species. There are keys to all forms, maps of their distribution by groups, and in the discussion of each, synonymy, notes on type and type locality, range, characters, and variation; measurements, remarks, and list of specimens examined. There is an account of 8 fossil forms, a 10-page bibliography, and an extensive index.

Classification: Lespedeza

Pieters, A. J. Some lespedeza relationships, Soil Conservation (Supt. of Documents, Washington, D. C., 10 cents a copy), 3(11), May 1938, pp. 265-266, 17 figs.

Lespedeza species occur naturally only in eastern Asia and eastern North America. There are about 125 species of which 20 are American and only 11 of those common. Description of groups of species, with especial emphasis upon the identification of L. sericea.

Conservation: Fur animals

Hamilton, W. J., Jr. Our fur-bearers--a vanishing natural resource, New York Zoological Society Bul. (185th St. & Southern Blvd., New York, N. Y., 35 cents a copy), 41(3), May-June 1938, pp. 94-101, 7 photos.

Figures are given showing the number of firms and persons engaged in the fur business and the annual turnover in skins and their money value. Receipts to trappers are widely distributed as a great deal of trapping is

done incidentally to other employment. Fur animals have value also as objects of sport and for food. Diminution of certain species and of all combined is described; each year sees a decrease. Protective legislation has always lagged and is still deficient. Instances of the effectiveness of protection of the beaver and otter. Preservation of suitable environment is a necessity. Control of predatory animals by poisoning has resulted in the death "of thousands of useful furbearers which are of no concern to the stockmen." Fur-farming is effective only in the case of the silver fox and to a lesser extent of the mink; it will not save the vanishing fur animals. "Fur merchants and the large raw fur receiving houses may be held partly responsible for this alarming crisis. By issuing price lists long before pelts are prime, it becomes a virtual invitation for the trapper to ply his trade prematurely. Overtrapping is thus encouraged by the very institution which should be most concerned with fur conservation. By accepting at a price any skin offered, the fur buyer encourages the trapper to clean up. Our fur-bearers are at the crossroads. Many of our most valued species are gone from areas that were well populated a few years back. The population of others has been so substantially reduced that they do not figure in the fur crop. If we are to conserve a part of this important resource, we must do so without delay."

"The death knell of several species was sounded long ago. Others are being crowded into oblivion. There is no necessity for terminating the vast annual harvest, involving a partial livelihood to many thousands of individuals. The fur trade is a billion-dollar industry. But we must face the fact that the remnants of our rich fur resources are fast diminishing. National conservation organizations and champions of wildlife everywhere must sound the alarm. Only through concerted effort can this fine native fauna be saved."

Comment: Something may have been omitted from the last paragraph or the wording changed as there does seem to be great need at least of considerably curtailing the fur harvest. In fact animals having the unfortunate distinction of producing high priced pelts are in the same position as the egrets were in the days of the plume trade; the financial temptation is so great that legal bars cannot prevent covert exploitation. It was elimination of the market that saved the egrets and probably no less drastic a step will avail the most valued fur-bearers.

Conservation: History in Wisconsin

Scott, Walter E. Conservation history, Wisconsin Conservation Bul. (State Conservation Dept., Madison, Wis.), 3(4), April 1938, pp. 26-37.

Supplemental information on the period 1915-18 and extension of the history to 1921-22. See also WILDLIFE REVIEW, Nos. 9, July 1937, p. 3; 10, October 1937, p. 3, and 11, February 1938, p. 3.

Conservation: Need in British Empire

Hubback, Theodore. Principles of wildlife conservation, Journ. Bombay Nat. Hist. Soc. (6 Apollo St., Bombay, India, 10 rupees a copy), 40(1), April 1938, pp. 100-111, 4 pls.

This is a plea addressed apparently to the British Empire in general. "Are the principles of Wild Life Conservation to continue as elusive conceptions without material form, or are they to become a living presence increasing in virility year by year? There appears to be a danger that these principles will be sacrificed for private profit. The present tendency to exploit all natural resources regardless of the future will eventually result in the disappearance of many species of the larger fauna unless such tendency is drastically checked. Until it is recognized that Wild Life is a valuable natural resource and that the benefits derived from an unguarded resource are wasting benefits x x x waste will continue till the resource has gone and the benefits have vanished."

The author strongly urges as a necessity for wildlife conservation of an independent organization with funds (derived from fixed sources) over which it has full control. Evidently he is impressed by the American system, particularly as exemplified in Pennsylvania, referring to it at some length. Skilled inquiry and research are needed to show what there is to conserve and how to conserve it. There being so many good reasons for wildlife conservation, the public may be expected to support it. Conservation should be based on so sound a policy and upon such dependable resources that it will not be destructively restricted during periods of stress. Hazards to conservation in Southeastern Asia and in Africa are discussed.

"After all, what are the principles of conservation which we can apply to wild life? I think we may claim that the chief object of conservation of wild life must be to prevent the disappearances of species. We cannot say we don't want such-and-such a species because it eats our fowls or disturbs our garden; its benefits to the universe in other ways may be more important than our pet fowls or our local garden. We can say we don't want such species in our backyard and we can take steps to protect our property, but we are wrong if we say such-and-such species should be exterminated. Our knowledge is much too incomplete to allow us to say anything of the sort. x x x Therefore, I think the practical application of steps to prevent extermination of species must be the foundation on which to build our framework of conservation. This can be done in many ways, but the most certain, most equitable and most spectacular method of achieving this is by setting aside certain areas of suitable land as permanent sanctuaries for the fauna."

"A wise policy of wild life conservation will provide for: (1) Adequate laws for protection; (2) adequate areas as permanent sanctuaries or refuges for species in their known habitat; (3) adequate organizations to enforce the former and administer the latter. If these three principles are insisted on, then we may have some hope for the future of the fauna of our Empire, but unless steps are taken, and taken soon, to recognize the critical

state of the wild life in many of our Colonies and Dependencies, and to check the present rate of destruction, the future can be contemplated only with apprehension. To those who know how inefficient and inadequate in many places our methods of wild life conservation are, the wild life in such places appears doomed to extinction. You can replace trees; you can sustain domestic animals by private breeding; but wild life must have an environment of its own in which to thrive and increase in a natural and normal fashion. The price to pay for the neglect of the observation of conservation principles as applied to wild life is a terrible one--no less than the disappearance forever of species after species."

Conservation: Waterfowl

Brant, Irving. "Sportsmen's" heaven is hell for ducks, Emergency Conservation Committee (734 Lexington Ave., New York, N. Y.) Publ. 71, 16 pp., 4 cartoons, 2 graphs, June 1938.

Some wealthy killers and organizations of them are interested only in preserving and increasing shooting privileges, not in conservation of the wild fowl. They seek to monopolize duck shooting by restoration of the use of bait and live decoys. They are in the minority but are powerful and should be steadily resisted. The 25 percent increase in waterfowl reported to have occurred since 1934 is insignificant considering the great need for restoration. "It would take an increase of 250 per cent--ten times as great--to bring waterfowl back to their numbers just before the 1930 drouth." The waterfowl belong to all citizens and must be preserved regardless of adverse pressure by special interests.

Cycles: Snowshoe hare

Chitty, Dennis, and Charles Elton. The snowshoe rabbit enquiry 1936-37, Canadian Field-Naturalist (582 Mariposa Ave., Rockcliffe Park, Ottawa, Canada, 25 cents a copy), 52(5), May 1938, pp. 63-72, 2 tables, 3 figs. (including 5 maps).

The 7th paper in a series reporting on the enquiry begun in 1931. Then the cycle was approaching its peak and now it is again showing upward trend. An interesting feature is great variance in phase of the cycle with locality. The report covers epidemics among the hares as well as data on increase and decrease.

Destruction: Sea otter

Andrews, C. L. Children of the sea, Alaska Sportsman (Ketchikan, Alaska, 15 cents a copy), 4(7), July 1938, pp. 8-9, 27-28, 31-32, illus.

History of the exploitation of the sea otter from the time of Bering (1742). It was barbarously and solely destructive throughout Alaska and even Californian waters down to the time of Wrangel (1830). He instituted restrictions on killing which, continued for about 25 years, resulted in some

restoration. Then came transfer to Usonian sovereignty and renewed exploitation pursued to such a length that in 1910, 31 schooners engaged in the business took only 30 skins. Since then protection by treaty has been established and in the most favorable localities the animals have again increased.

Diseases and Parasites: Anemia

Jellison, Wm. L. (Tick-host anemia:) A secondary anemia induced by Dermacentor andersoni Stiles, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 24(2), April 1938, pp. 143-154, 6 tables.

The experimental work was with domesticated rabbits but reference is made to anemia in wild moose, jack rabbits, and foxes. Author's summary: "The writers have repeatedly produced a secondary anemia in rabbits by heavy infestations of ticks, Dermacentor andersoni. This condition is noninfectious but is due primarily to exsanguination by the rapidly engorging female ticks and appears comparable to the anemia observed in tick-infested domestic stock and game animals. It is believed, therefore, that tick-host anemia is not only an experimental disease but occurs with some frequency in nature and may be the immediate cause of death in animals." Bibliography of 7 titles.

Diseases and Parasites: Blood parasites, Nebraska birds

Coatney, G. Robert, and Evaline West. Some blood parasites from Nebraska birds--II, American Midland Naturalist (Notre Dame, Ind., $1.00 a copy), 19(3), May 1938, pp. 601-612, 1 pl., 2 tables.

Haemoproteus archilochus from the ruby-throated hummingbird, H. quiscalus from the bronzed grackle, and Leucocytozoon coccyzus from the yellow-billed cuckoo are described as new. There are notes also on previously described species of Haemoproteus, Leucocytozoon, Plasmodium, and Trypanosoma and on some unidentified Haemoproteus, including descriptions, measurements, and names of hosts. Bibliography of 11 titles.

Diseases and Parasites: Coccidiosis

Kellogg, H. B., Jr. Coccidia and the fox, Wisconsin Sportsman (2004 Winnebago St., Madison, Wis., 10 cents a copy), 2(8), May 1938, p. 2.

General discussion of the occurrence, progress, and symptoms of the disease. Adults have some degree of resistance but pups are seriously affected. There is no effective treatment and thorough sanitation is the best defence. Depending on the period required for the life cycle of the parasite (and there being no reinfection), the disease is self-limited. Careful feeding and protection from unfavorable conditions constitute good treatment for affected animals.

Diseases and Parasites: Dangers of introduction with cottontails

Chaddock, T. T. Some facts concerning cottontails imported into Wisconsin, Wisconsin Conservation Bul. (State Conservation Dept., Madison, Wis.), 3(4), April 1938, pp. 49-52.

Report on autopsy of 14 specimens from Kansas. Coccidia, tapeworms, flukes, nematodes, and tularemia bacilli were demonstrated in these animals. The diseases caused by these parasites are discussed and the danger of introducing them emphasized.

Diseases and Parasites: Dog tick

Bishopp, F. C., and Carroll N. Smith. The American dog tick, eastern carrier of Rocky Mountain spotted fever, U. S. Dept. Agr. Circ. 478 (Supt. of Documents, Washington, D. C., 5 cents a copy), 25 pp., 13 figs., 8 tables, April 1938 (June).

The dog is the most common host of adults and nice of the immature stages of this tick. Rabbits are of little importance, and birds do not serve at all, as hosts. Dermacentor variabilis is concerned in the transmission of spotted fever, now increasing in eastern States, and of tularemia. Distribution, hosts, life history, seasonal incidence, overwintering, and natural and artificial control are discussed. Bibliography of 15 titles.

Diseases and Parasites: Eelgrass disease on the Pacific Coast

Young, Edward L., III. Labyrinthula on Pacific Coast eel-grass, Canadian Journ. Research (National Research Council, Ottawa, Canada, 25 cents a copy), Sec. C, 16(2), March 1938, pp. 115-117.

Note on occurrence of Labyrinthula, recognized as the causative agent of the wasting disease of eelgrass on the Atlantic Coast. Report of its discovery in specimens from Nanaimo, British Columbia. Discussion of factors possibly related to occurrence of the parasite. Comment: If the wasting disease proceeds as it has on the Atlantic Coast, the effects in reducing an important food of Pacific Coast waterfowl will be serious.

Diseases and Parasites: Microfilarial periodicity

Boughton, Donald C., Elon E. Byrd, and Horace O. Lund. Microfilarial periodicity in the crow, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 24(2), April 1938, pp. 161-165, 1 fig., 1 table.

Method of making counts, variations in them, and possible correlations with periods of activity and calm in the host. Bibliography of 6 titles.

Diseases and Parasites: Minnesota investigations

Green, R. G. et al. Minnesota Wildlife Disease Investigations (Dept. of Bacteriology, University of Minnesota, Minneapolis), December 1937, pp. 169-177, tables 100-103; January 1938, pp. 1-6, tables 1-2; February 1938, pp. 7-14, tables 3-7; mimeographed.

December.--Incidental autopsies yielded information on blackhead in quail, nematode infection in Hungarian partridge, and shock disease in the snowshoe hare. A note is given on the current phase of the cycle of the last-named species as revealed by trapping. There is a special article (pp. 173-177) by R. G. Green, C. A. Evans, and W. E. Carlson on Chastek paralysis, a disease of penned foxes due to deficiency in vitamin B brought on by the use of fresh fish in the diet.

January.--Gross lesions of tularemia in cottontail rabbits and snowshoe hares are described and compared. They are pronounced in the susceptible rabbit but usually obscure in the resistant hare. Autopsies revealed blackhead as the cause of death of 6 out of 9 quail from the State game farm. A few miscellaneous necropsies are presented as well as data on the progress of the snowshoe hare cycle.

February.--The comparative pathology of tularemia is tabulated and described for 3 species of mammals and 4 of birds. Cottontails and muskrats dying from tularemia in nature usually show abscesses of the liver and spleen; snowshoe hares and birds seldom do. Data on experimental tests of the immunity of snowshoe hares to tularemia are presented in tabular form and briefly discussed. There is a preliminary report on a test of "brush" as food for hares, the results of which indicate that "brush" is not a complete diet. Included also are notes on the pathology of miscellaneous specimens, and on the tendency of the cycle in hares.

Diseases and Parasites: Parasites of rodents

Erickson, Arnold B. Parasites of some Minnesota rodents, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 19(2), May 1938, pp. 252-253.

Reports on examinations of 88 mice of 6 species, giving the proportion infested, and the kinds and numbers of parasites, including nematodes, cestodes, flukes, fly larvae, fleas, and biting and sucking lice.

Diseases and Parasites: Pneumonia in bighorn

Marsh, Hadleigh. Pneumonia in the Rocky Mountain bighorn sheep, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 19(2), May 1938, pp. 214-219.

In animals from Glacier and Yellowstone National Parks and from Sun River Canyon, Montana, the primary etiological factor in the disease was the lungworm, Protostrongylus stilesi, with secondary bacterial invasion. Of organisms involved in that infection, the chief is "the diphtheroid Corynebacterium pyogenes, although a Pasteurella is constantly present in the diseased lungs. x x x It seems probable x x x that the lack of normal winter range, causing crowding and overgrazing on the fall and spring range, combined with feeding in the case of the Glacier Park sheep, are factors in the development of clinical parasitism and secondary bacterial pneumonia x x x The losses from pneumonia in young lambs on the National Bison Range are of a different type x x x Parasites are not involved x x x and the pneumonia is of an acute type. Our findings in the only two cases in which bacteriological and histological work was done indicate that the pneumonia is primarily due to invasion by a Pasteurella, with C. pyogenes as a secondary invader."

Diseases and Parasites: Ruffed grouse

Clarke, C. H. D. Organisms of a malarial type in ruffed grouse with a description of the schizogony of Leucocytozoon bonasae, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(3), July 1938, pp. 146-150, 1 pl.

Author's abstract: "The occurrence of Leucocytozoon bonasae in the ruffed grouse has been associated with a cycle in numbers. Schizogony takes place in endothelial tissue and must be studied in section. Differences in schizogony can be interpreted in terms of resistance in the host. Gametocytes do not appear in the blood of the young until a check in the multiplication of schizonts has occurred. In winter, infection is represented only by a small number of cyst-like schizonts. Besides leucocytozoa, Haemoproteus, not previously recorded from ruffed grouse, was found in preparations made in the summer of 1935." Ontario, Canada.

Diseases and Parasites: Ticks of British Columbia

Hearle, Eric. The ticks of British Columbia, Scientific Agriculture (1005 Confederation Bldg., Ottawa, Canada), 18(7), March 1938, pp. 341-354.

A list of the species (19) known or believed to occur in British Columbia, also a list of hosts and the ticks known to attack them. Remarks on distribution and abundance of the species and on disease-transmission by ticks. The author died in 1934 and the paper has not been brought down to date. Bibliography of 28 titles.

Diseases and Parasites: Trematode from beaver

Kofoid, Charles A., and James T. Park. A new trematode, Paramphistomum castori sp. nov., from Castor canadensis baileyi Nelson, from Mary's River, Nevada, Univ. Calif. Publ. Zool. (University of California Press, Berkeley, Calif.), 41(27), pp. 419-422, 1 fig., 1937.

Original description and illustrations; bibliography of 5 titles.

Diseases and Parasites: Trematodes of birds

Chostun, E. L. Tanaisia polidnae n. sp. and Orchipedum tracheiola (Trematoda), Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 24(2), April 1938, pp. 135-141, 1 pl.

The new species is from a red-backed sandpiper (Pelidna a. sakhalina) collected in Michigan. There is an account of previously described species and detailed comparison with two of them. A history of study of the genus Orchipedum also is given and description of the species named which is recorded from the white-winged scoter. Both are figured and there is a bibliography of 13 titles.

Diseases and Parasites: Trematode from muskrat

Olivier, Louis. A new trematode, Allasogonoporus marginalis, from the muskrat, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 24(2), April 1938, pp. 155-160, 1 fig.

New genus and species based on specimens collected in Michigan, illustrated. Discussion of family relationships. Bibliography of 15 titles.

Ecology: Acorn distribution by squirrels

Olmsted, Charles E. Vegetation of certain sand plains of Connecticut, Botanical Gazette (University of Chicago Press, Chicago, Ill., $2.50 a copy), 99(2), pp. 209-300, 26 figs., 6 tables.

The point of interest to wildlife managers is that, "Black oak invades many communities through burial of its acorns by squirrels." Without dispersal by squirrels, Quercus velutina would not enter many of the areas, and even though acorns were present, establishment would not occur without burial. "Acorns in squirrel caches are usually buried to a depth of 2 to 4 inches, each cache being from 1 to 3 feet in length and 2 to 3 inches wide. The range in number of acorns found in many caches was 23 to 84 and the average about 40." Notes are given on germination of the cached acorns and photographs illustrate sprouts and trunks arising from caches.

Ecology: Animal checks on oak reproduction

Wood, O. M. Seedling reproduction of oak in southern New Jersey, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.50 a copy), 19(2), April 1938, pp. 276-293, 4 figs., 2 tables.

Squirrels and other animals destroy acorns on the tree, on the ground, and in seed beds and eat also the seedlings. Animal-proof enclosures, however, can be made. Coatings of red lead and of Crotox repelled attack as long as viscous, but not when dry. The combined animal attack may almost entirely eliminate seedling reproduction.

Ecology: Bees in relation to planting programs

Paddock, F. B. Relation of beekeeping to wildlife conservation, American Bee Journal (Hamilton, Ill.), 77(11), Nov. 1937, pp. 519-520, 549.

The relation, somewhat tenuous, is that planting programs of the Soil Conservation Service and other organizations will increase forage for bees and the latter will benefit the plantings by insuring their fruitfulness.

Ecology: Carrying capacity, big game

Young, Vernon A. The carrying capacity of big game range, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(3), July 1938, pp. 131-134, 1 pl., 1 table.

The use of airplanes in counting big game and of the square foot density method of estimating available browse are new tools which enable the wildlife manager to go forward more confidently with all matters depending upon adequate knowledge of carrying capacity. Overbrowsing is described and illustrated. Available and palatable browse plants on two National Forests in Idaho are tabulated; Ceanothus and Salix lead. The square foot density method of appraising vegetation and its applications are described.

Ecology: Census methods for mammals

Dice, Lee R. Some census methods for mammals, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(3), July 1938, pp. 119-130.

Author's abstract: "Counts of populations on given areas for a few kinds of mammals may be made by organized drives. For most small forms, however, the size of population must be calculated from a determination of the average size of the individual home range. Several methods are proposed for making such calculations. Where counts of individuals cannot be taken the frequency index is often useful."

Ecology: Census of waterfowl broods

Stoudt, Jerome H. The number of waterfowl and the kill on the Chippewa National Forest, 1937, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(3), July 1938, pp. 82-93, 1 fig., 15 tables.

Methods and results of a waterfowl brood census tabulated according to types of habitat and by species. Comparative abundance of the kinds of ducks also is shown in a table; leaders are: mallard (32%), blue-winged teal (22), golden-eye (20), and baldpate (13). The hunting take is analyzed according to the type of lake where made, and tabulated by species in a way to show not only the kill but its relation to the number of birds produced on the Forest. In 1937, "The kill during the open season exceeded the summer population by 30% or approximately by 9,000 ducks."

Ecology: Drainage operations

Authors. Proceedings of the 24th Annual Meeting of the New Jersey Mosquito Extermination Association (Agricultural Experiment Station, New Brunswick, N. J.), 1937, 239 pp., illus.

Four papers, while not devoted to discussion of the inter-relations of mosquito control operation and wildlife conservation, pay some attention to the subject.

W. S. Corkran of the Delaware Mosquito Control Commission refers to the acquisition of lands by the Biological Survey and Resettlement Administration, which are great mosquito-breeding areas, and to efforts to get those organizations to agree to programs of mosquito control. He says, "we believe that mosquito control can be attained with little harm, if any, to wildlife. On many marshes, it can be practiced, we believe, with actual benefit to the desirable wildlife." (p. 141.)

Norman Taylor, the well known plant ecologist, discussing objections to ditching of the salt-marshes of Long Island, expresses the opinion, based on field research, that opposition cannot justly be predicated on alleged change in ecology. In the conclusions of his Preliminary Report on the Relation of Mosquito-control Ditching to Long Island Salt-marsh Vegetation (pp. 211-217), he states that, "Ditching has made no fundamental change in the make-up of the salt-marsh vegetation." (p. 217.)

Dr. L. L. Williams of the U. S. Public Health Service, noting that there being a considerable roving population, including no doubt some carriers of malaria, the disease may be reintroduced into parts of the country that have been considered practically free from it. Recent increase in water impoundment emphasizes the risk. Among other precautionary suggestions is one that, "The creation of new wildlife refuges should be confined to relatively uninhabited areas, or else anopheline control should be an integral part of the plan for the refuge." (p. 220.)

Dr. Thomas J. Headlee, State Entomologist of New Jersey, in his address on mosquito problems referred to the wildlife situation in the following words: "In view of the present movement for the preservation of wildlife, I think it is obvious that mosquito-control organizations must collect data on the relation of mosquito production to other forms of wildlife, both beneficial and injurious to man. Failure to do this may encourage the establishment of wildlife refuges which in themselves may become tremendous producers of mosquitoes and affect adversely the health and property values of persons living in their neighborhood. Also, the accumulation of data should be carried forward on the relation of antimosquito works to the growth and propagation of other forms of wildlife, both harmful and beneficial. The remarks which were made concerning funds in connection with the study of natural enemies of mosquitoes apply with equal force here."

Ecology: Farm wildlife

Allen, Durward L. Ecological studies of the vertebrate fauna of a 500-acre farm in Kalamazoo County, Michigan, Ecological Monographs (Duke University Press, Durham, N. Car., $1.50 a copy), 8(3), July 1938, pp. 348-436, 28 figs., 5 tables.

This report includes fairly detailed descriptions of the climate, history, vegetation (including successions and their principal plant components and animal inhabitants), and seasonal changes, as observed on a 500-acre tract, embracing the Kellogg Bird Sanctuary and adjacent territory in Kalamazoo County, Michigan. So far as practicable the animal populations were censused by a variety of methods which are described and the results are given for the principal species for the two years and also discussed and summarized. The principal larger mammals and birds treated are the cottontail, fox squirrel, skunk, pheasant, and quail. Animal inter-relations are discussed for the different associations and seasons, with emphasis on food relationships. There is a summary, extensive bibliography, check-lists of the vertebrates of the farm, and a table showing the abundance and availability (November-March) of fruits and seeds.

The following extract is from the author's summary. "It is evident from this study that relatively dense populations of three species of large mammals have existed here together. The cottontail rabbit, the skunk, and the fox squirrel are abundant, and there is no apparent reason why they should not continue to thrive. Six species of small mammals are also particularly plentiful. The spermophile, prairie deer mouse, meadow mouse, white-footed mouse, short-tailed shrew, and prairie mole evidently find this farm a very favorable habitat.

"Among birds the number of pheasants is low. The species has been conspicuously preyed upon by the Cooper hawk, but perhaps no more here than elsewhere. The drop in numbers from late fall to spring has been less than one-third, but the productivity of the breeding stock has been low. Evidently about one-third of the nests of pheasants are broken up by natural enemies. It is, however, not certain that the status of the bird can be attributed in any large measure to this factor, as such a proportion of nest losses may occur even in favorable areas. The exact ways in which this environment is limited for pheasants have not been definitely established.

"The large amount of cover makes this farm favorable to pheasants, rabbits, and other species in severe winter weather. The area also has been prolific of natural food supplies which supported large numbers of winter songbirds and other animals. The flora is very favorable to herbivorous species and hence the large, though probably not abnormal, numbers of small mammals found here are to be expected. It follows from this that the carnivorous species dependent upon the latter should also find the farm a favorable habitat. This is notably so in the case of the skunk; and the numbers of the weasel, cat, marsh hawk, redtail, horned owl, crow, and other carnivores are apparently about 'normal' for these species.

"On this area of farm land we have, in general, copious food supplies and abundant cover. The animal populations are characterized by large numbers of rabbits, squirrels, and skunks, but small numbers of pheasants. A knowledge of the consistency with which these relative numbers do or do not occur on other areas will throw further light upon the extent to which each of these species tends to determine the status of others."

An interesting report on 2 years of evidently careful work. Whenever possible, however, such studies should be carried on long enough to cover at least one complete population cycle of the principal wildlife species concerned.

Ecology: Lake surveys, Wisconsin

Bordner, John S. et al. Lake survey data. Douglas County, Wisconsin, 10 pp. Sawyer County, Wisconsin, 14 pp. Mimeographed. 1938. (Division of Land Economic Inventory, Capitol, Madison, Wis.)

Notes on lake study including the effects of seasonal changes in temperature, periodic variations in water level, mineral nutrients, role of plant life, and possibilities for improvement. Tabulated information about lakes relates among other things to location, accessibility, area, depth, condition as to outlets, character of water, and presence and abundance of fishes and plants.

Ecology: Populations, crow roosts, New York

Emlen, John T., Jr. Midwinter distribution of the American crow in New York State, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.50 a copy), 19(2), April 1938, pp. 264-275, 3 figs., 3 tables.

Difficulties in censusing are discussed; the history of crow roosts in New York is traced; ecological factors including climate, physiography, soil fertility, enemies, cover, and food are treated in relation to roosts. Author's summary: "(1) Total of 225,000 crows were present on 20 wintering territories in New York State during the winter of 1932-33; (2) the boundaries of these territories have not changed appreciably in the past half century or more; (3) there is no evident correlation with any current ecological factor investigated. Territory boundaries coincide more closely with the original distribution of the 'southern hardwood forest' than with existing vegetational cover; (4) the winter range of the crow in New York State may possibly be delimited by an innate 'homing' factor established in the past in the birds of each population unit under primitive ecological conditions, and handed down essentially unaltered, through the recent decades of extensive habitat change." Bibliography of 27 titles.

Ecology: Populations, wren-tit

Erickson, Mary M. Territory, annual cycle, and numbers in a population of wren-tits (Chamaea fasciata), Univ. Calif. Publ. Zool. (University of California Press, Berkeley, Calif.), 42(5), pp. 247-334, pls. 9-14, 16 figs., 5 tables, 1938.

The wren-tit's possession of territory is continuous and the bird may occupy the same territory for successive years. Defense of territory is formalized consisting of vocal threats and posturing and rarely deserves to be called fighting. The average size of territories was .8 acre. They do not appear to be regulated by quantity of food of which there is an excess. On the average 4 eggs are laid and there is only one brood a year. Voice, food, roosting, and preening are rather briefly discussed and there are summaries relating to territory, population, and life-history.

Ecology: Wildlife in forests

Haig, I. T. Forest wildlife and silviculture, Science (Lancaster, Pa, 15 cents a copy), 87(2265), May 27, 1938, pp. 485-487.

There is much discussion of how forests affect wildlife but not of the reverse, a deficiency this paper to some extent repairs. Silviculture is concerned with all things affecting the welfare of forests, and among these certain forms of wildlife are important, especially in relation to tree reproduction. The consumption of seeds by squirrels is a controlling factor in conifer reproduction in the Southwest. These animals as well as several kinds of birds destroy both seeds and seedlings and may get the entire crop produced by pines having the larger kinds of seeds, thus giving smaller-seeded species preponderance in regeneration stands. The seed-eaters have to be taken into consideration in planting operations and often excluded or destroyed to insure success. In conclusion the author writes: "The study of the animals themselves their life habits and so on, are of course primarily the task of the forest biologist. Some of the questions which the silviculturist must put to the biologist are: (1) What are the important forest-inhabiting animals and birds affecting forests and forest practices? (2) What is their life cycle, their food habits, etc.? (3) What effect will the destruction of other animals, including predators, have on them? (4) How are they affected by environmental changes which the silviculturist may make--as through clear cutting, etc.?

"The forester must have the answer to these and similar pertinent questions before satisfactory forest-cutting practices can be worked out in silvicultural terms."

Ecology: Wildlife in tree planting

Ridley, H. N. Nature's tree planters, The Tree Lover (Council for the Preservation of Rural England, 4 Hobart Place, London, S. W. 1, England, 3 shillings a copy), 2(23-24), Spring and Summer 1938, pp. 196-197.

Wild cattle and swine; deer, squirrels, rook, jay; role and importance in planting.

Ecology: Wildlife range essentials

King, Ralph T. The essentials of a wildlife range, Journ. Forestry (Mills Bldg., Washington, D.C., 50 cents a copy), 36(5), May 1938, pp. 457-464.

A closely reasoned exposition, the analytical framework of which is about as follows: A wildlife management program should include inventory, census, yield determination, diagnosis, and control. Inventory determines the species present and their distribution, not only of the animals to be managed but also of their food and cover plants, and competitors. Censusing relates to quantities and also should be broadly inclusive; interspersion and juxtaposition of environmental elements are part of this field. Yield determinations involve the annual productivity of all factors. Diagnosis determines whether wildlife populations are, or are not, as they should be; essential steps are (1) recognition of the factors operating against the various species, (2) evaluation of the effects of these factors, and (3) identifying limiting factors. Control measures consist for the most part of modifications of the environment.

Environmental factors embrace essentials and non-essentials; the latter may be recognized but in practice ignored. Essentials are the entities, foods, coverts, and water resources, and their patterns, juxtaposition, and interspersion. Home range for any creature must contain all of the species requirements for both sexes and all age classes for all seasons and for all of the animal's activities. Even if all requirements are present, they do not constitute habitable range unless they are distributed in such a manner that every one of them occurs within the cruising radius of the animal concerned. Carrying capacity does not depend solely upon available quantities of resources but also on their interspersion so that they will serve the varying units of range as determined by specific population saturation levels. Maximum productivity can be attained only when all essentials are at optimum.

Economics: Value of fur animals, Pennsylvania

Morton, J. N. Fur bearing animals add to farm income, Pennsylvania Game News (State Game Commission, Harrisburg, Pa., 10 cents a copy), 9(4), July 1938, pp. 14, 32, 1 photo.

Average annual value more than a million dollars. Muskrat, skunk the most important species; notes on their foods, habitats, and conservation. Sketch of the bounty system under which more than $100,000 is paid out each year. Most of the income from trapping and bounty goes to farm families.

Economics: Value of muskrats, New Jersey

Harris, Earl S. Muskrat culture and its economic significance in New Jersey, Proc. 24th Ann. Meeting N. J. Mosquito Extermination Association (Agricultural Expt. Station, New Brunswick, N. J.), 1937, pp. 20-24, 6 figs.

Of 4 types of marsh available in New Jersey, the banked fresh-water meadow is most productive of muskrats and probably also is the most troublesome from the standpoint of mosquito control. Channels made by muskrats, however, are an aid in that work. Muskrats and their staple foods decrease in proportion to salinity of the water. The most important food plants are

of the genera Scirpus, Spartina, and Typha. Tide marshes will yield yearly about 3, and banked meadows about 6, muskrats to the acre. Annual receipts from the industry for the State average about three quarters of a million dollars.

Food Habits: Arctic birds and mammals

Cottam, Clarence, and Harold C. Hanson. Food habits of some arctic birds and mammals, Field Museum (Chicago, Ill.), Zool. Series, 20(31), June 1938, pp. 405-426.

Report on species observed on the Bartlett Expedition of 1936 to Newfoundland, Labrador, and Greenland, including field observations on occurrence, habits, and food and laboratory analyses of the contents of collected stomachs. Twenty-three species of birds and 8 of mammals are discussed.

Food Habits: Beaver

Atwood, Earl L., Jr. Some observations on adaptability of Michigan beavers released in Missouri, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(3), July 1938, pp. 165-166.

Beavers transplanted in 1928 and 1929 throve and spread to a distance of 80 miles. Due presumably to the swiftness of headwaters the movement has been entirely downstream. Cornfields, sources of both food and dam material, appear to have been an important factor in fixing the location of colonies. Natural foods (17 kinds listed) also are well utilized. The number of cuttings is proportional to the abundance of the plants within 100 feet of the stream bank.

Food Habits: Bird consumption of pine seeds

B.[urleigh], T. D. Bird damage to longleaf pine reproduction, Southern Forestry Notes (Southern Forest Expt. Sta., New Orleans, La.), 22, May 1938, p. [3], mimeographed.

In good seed years birds are attracted in numbers and are responsible for much of the losses of both seeds and seedlings. In years of scanty seed production not so many birds are present and losses are negligible. Meadowlarks, blackbirds, bobwhites, and mourning doves are important pine seed consumers.

Food Habits: Buteo hawks

Errington, Paul L., and W. J. Breckenridge. Food habits of Buteo hawks in North-central United States, Wilson Bul. (Sioux City, Iowa, 50 cents a copy), 50(2), June 1938, pp. 113-121.

Data chiefly from stomach examination as pellets do not yield very satisfactory information. The extent of carrion feeding is discussed. The findings are discussed by species and regions, the red-tailed, red-shouldered, broad-winged, Swainson's, and rough-legged hawks being treated. This is essentially a contribution of facts toward appraisal of the food habits of the birds concerned and already is so concise as not to be readily summarized. Availability is recognized as a prime factor in food gathering. "What a red-tail or any other Buteo eats is largely a matter of what is to be had without too much trouble."

Food Habits: Coyote

Soulen, Garrett H. Food habits of the coyote, Minnesota Conservationist (State Dept. of Conservation, St. Paul, Minn., 15 cents a copy), 58, June 1938, pp. 20, 27-30, 32, 1 photo.

A compilation including testimony both for and against the coyote, and summarizing food habits reports. Author's summary: "Thus we see that investigations by scientists and experts show that when the problem of coyote control based on his food habits is attacked on a broad basis and without undue stress being placed on conditions in certain localities, the results certainly favor the conservation of the coyote. On the other hand cattle raisers and especially sheep raisers wish to see a policy of complete extermination carried out. Undoubtedly both sides have rights to their convictions, but certainly, complete annihilation or a policy of complete protection would disturb the balance of nature. Therefore, let us choose a middle path; control the coyote in sheep-raising districts, but only to a limited extent, and in others leave the problem of control to local hunters who are generally well able to cope with the situation."

Food Habits: Elk browse

Greffenius, R. J. Results of the Copper Ridge Basin elk study, U. S. Forest Service Rocky Mountain Region (Denver, Colo.), Bul. 21(4), April 1938, pp. 14-15, mimeographed.

Studies on the Routt National Forest showed that in the order of plants browsed in proportion to the total present, mountain ash, mountain balm, serviceberry, chokecherry, and scrub oak were the favorite foods of the elk. Considering the quantity of each available in connection with preference ratings, it was judged that in value as providing winter sustenance the plants studied should be ranked as follows: serviceberry, scrub oak, chokecherry, mountain ash, mountain balm, willow, hawthorn, mountain maple, and aspen. 86 percent of the browse is supplied by the first four of these plants. The range is under- rather than over-stocked.

Food Habits: European partridges

Anon. The foods of adult partridges, I. C. I. Game Researches (Imperial Chemical Industries, Millbank, London, England), Advisory Leaflet 16, 7 pp., and folded insert containing 2 tables of food percentages and frequencies and a colored chart showing seasonal percentages of foods. March 1938.

This is a summary of the paper by Middleton and Chitty abstracted under the same heading in WILDLIFE REVIEW, No. 13, March 1938, p. 7, with addition of the graphic matter noted in the reference.

Food Habits: European partridges

Collinge, Walter E. Food of the partridge, Nature (St. Martin's St., London, W.C. 2, England, 1 shilling a copy), 141(3575), May 7, 1938, p. 834.

Referring to the paper by Middleton and Chitty abstracted in WILDLIFE REVIEW, No. 13, March 1938, p. 7, Dr. Collinge suggests that the reason for the great discrepancy in bulk proportion of insect food reported by him in 1917 (40.5%) and that stated by the authors reviewed (2.5%) is an actual change in food habits such as he avers has also occurred in the case of the rook and the starling in about the same period. He further suggests that the change has not been beneficial as the partridge in recent years has suffered great losses from strongylosis and coccidiosis.

Comment. The fact that Middleton and Chitty examined only crop contents explains in part the different results reached as to proportions of insect food as the hard parts of insects are known to accumulate in gizzards. They say, "There is no reason to doubt that the crop contents alone form a truly representative sample of the food eaten. As there is no evidence to suggest that some food items pass more quickly than others from the crop to the gizzard, it may be safely assumed that the material found in the crop of a partridge at death x x x is the food taken a short time before."

That there may be a fallacy here is indicated by a paper by Swenk and Selko on food of the sharp-tailed grouse (manuscript) as these authors repeat for plant after plant (of which both seeds and leaves occurred) that no leaves were found in the gizzards, no seeds in the crops. The suggestion is that seeds may go direct to the gizzard. Gizzards are known to have differential powers of retention with respect to grit and there may be phenomena with respect to the flow of food from crop to gizzard with which we are unacquainted. The contents of gizzards and crops are sometimes mixed, possibly due to convulsions associated with a violent death struggle.

Food Habits: Horned toads

Knowlton, George F. Horned toads in ant control, Journ. Economic Entomology (450 Ahnaip St., Menasha, Wis., 75 cents a copy), 31(1), Feb. 1938, p. 128.

Summary of the stomach contents of 51 Phrynosoma douglassi ornatissimum and 52 P. platyrhinos from Utah, ants predominating in both cases. A nearly mature individual of the second species was observed to eat 89 harvester ants (Pogonomyrmex occidentalis) in an hour.

Food Habits: Owls

Wilson, Kenneth A. Owl studies at Ann Arbor, Michigan, The Auk (3200 22nd St. N., Arlington, Va., 75 cents a copy), 55(2), pp. 187-197, 1 fig.

Notes on traits, ecological relationships, and food habits (from study of pellets) of 5 species of owls, Discussion of weathering of pellets, and relationship of the owls to songbirds and to mammals.

Food Habits: Sciurus aberti nimus

Coughlin, Louis E. The case against the tuft-eared squirrel, U. S. Forest Service Rocky Mountain Region (Denver, Colo.), Bul. 21(4), April 1938, pp. 10-12, mimeographed.

Sciurus aberti nimus, for which several vernacular appellations are given, is numerous among ponderosa pines in and near the San Juan National Forest. General behavior is sketched and food habits emphasized. The squirrels cut off the tips of branches of the pine and strip bark from 3-7 inches of the stubs; bark from branches up to 3 inches in diameter also is eaten. The damage is termed serious and is said to have largely escaped identification by being confused with porcupine work; the latter is not important. The squirrels also consume large quantities of pine seed, eat seedlings, and destroy the eggs and nestlings of birds which benefit the trees.

Food Habits: Short-eared owl

Snyder, L. L., and C. E. Hope. A predator-prey relationship between the short-eared owl and the meadow mouse, Wilson Bul. (Sioux City, Iowa, 50 cents a copy), 50(2), June 1938, pp. 110-112, 2 tables.

Analysis of a long series of records shows that the short-eared owl, while at times numerous in the Toronto, Ontario region, at othersis scarce or absent. Attention being directed to the birds during a period of great abundance of field mice, investigations were made of more than a thousand pellets. In percentage of animals represented in the pellets, meadow mice stood at 71.7 and deer mice at 27.3. The following year when the abundance of voles was reduced, 252 pellets were examined and the comparable percentages found to be 93.7 and 5.3. Interpretations of these results are suggested; one is that predators feeding heavily on a population of plague proportions were a factor in reducing it before the next breeding season.

Food Habits: Skunk

Wight, H. M. Food taken by the eastern skunk (Mephitis m. nigra) with particular reference to birds and eggs, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, 10 cents a copy), 9(3), June 1938, pp. 12-13, 30, 2 photos, 1 graph, 1 map, 1 table.

Brief review of 4 titles from the extensive previous literature. Account of the Northville, Michigan, project begun in 1928 in which an effort was made "to become as intimately acquainted as possible with each skunk den and its occupants." The food analyses were based on feces and are tabulated both numerically and volumetrically. In both senses the percentages of bird remains is relatively low, 0.7 to 8.0, except in a single locality where the percentages were very high (73 and 77) due chiefly to the availability of dead poultry thrown in a barnyard. The records for dens and groups of dens are discussed and the findings indicate "that the skunks inhabiting the 78 dens investigated, seldom, if ever, killed birds." Special care was taken to segregate and identify fragments of eggshells. They were found in 17.7 percent of the samples from 14 percent of the dens. Hen eggs were identified in 30 cases, those of quail in 2, pheasant 1, crow 1, and small birds 9. Most of the hen eggs apparently did not represent depredations. Small bird nests are not more frequently raided because they are discovered only by chance in the skunks characteristic method of hunting. Birds, especially the larger ones, may be able to drive skunks away from their nests. "There is much evidence to indicate that the skunk is not a natural egg-eating animal." If control is necessary, only offending individuals should be eliminated. The food-graph shows the bulk of the food of the skunks to be insects, with mammals, mostly mice, second, and grains and fruits third, in importance.

Life Histories: Beaver

Bradt, Glenn W. A study of beaver colonies in Michigan, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 19(2), May 1938, pp. 139-162, 1 fig., 7 tables.

Report on research since 1929 as a basis for management by the Game Division of the Michigan Department of Conservation. Notes on trapping by an improved aluminum alloy live-trap, and on handling and transporting beavers; identification of sexes; and marking the animals by tagging and branding their tails. A careful study of the numerical composition of 57 beaver colonies gave an average of 5.1 animals per colony. The number is not closely correlated with those of lodges, bank burrows, or dams. The "typical" beaver colony consists of two parents, yearlings, and kits of the current year. The sexes exist in about equal numbers; there is a single litter of 3 or 4 young. The most important foods are aspen, maple, and willow, but a great variety of plants are sampled, and aquatics are consumed to a considerable extent in summer. "The beavers studied cut between 200 and 300 trees each per year. One acre of poplar (aspen) should support an average beaver colony from 1 to 2.5 years, depending on circumstances. Yearlings are permitted to remain in the colony, but the two-year-old beavers leave or are driven from the home colony shortly before the birth of the second annual litter. Beavers do not always follow water courses during emigration, but may undertake long overland journeys. The emigration of the two-year-old beavers provides a method of dispersal, and tends to establish new colonies in areas not previously stocked with beaver. The size and composition of beaver colonies is such as to permit the efficient and economical use of food supplies adjacent to small bodies of water." Bibliography of 16 titles.

Life Histories: Coot

Friley, Charles E., Jr., Logan J. Bennett, and George O. Hendrickson. The American coot in Iowa, Wilson Bul. (Sioux City, Iowa, 50 cents a copy), 50(2), June 1938, pp. 81-86.

After many trials, some disastrous, it now appears that a good many of the lakes, marshes, and potholes of Iowa are safe from drainage and will be available indefinitely for occupation by waterfowl. Coots are numerous both as migrants and breeders. The authors' observations permit remarks on habitat ecology, and the effects of changes in it, nesting and factors affecting it, number of eggs, hatch, habits of young, and relation of the coots to predators and to other associated species.

Life Histories: Coyote reproductive cycle

Hamlett, G. W. D. The reproductive cycle of the coyote, U.S. Dept. Agr. Technical Bul. 616 (Supt. of Documents, Washington, D. C., 10 cents a copy), 11 pp., 2 pls., 2 figs., 1 table, July 1938.

Report on a histological study of testes and ovaries collected at all seasons combined with a summary of field notes on breeding and on numbers of young in dens. The coyote has a definitely limited breeding season that is somewhat longer, however, in males than in females. Production of more than one litter in a year is highly exceptional. The period of gestation is 60-63 days, the average number of embryos in pregnant females 6.23, and of young in dens 5.7.

Life Histories: European moose

Kostron, Karel. The European moose-deer [Alces alces (L.)] of Poland, East Prussia, and Baltic Lands, Institut National Agronomique Brno (Cerna Pole, Brno, Czechoslovakia) Bul. 1938 (D 25), 99 pp., 31 figs.

This report is in the Czech language, with headings and legends of figures rendered also in Polish and English. The paper is evidently comprehensive and written from the management point of view. Knowing nothing of the Czechoslovakian language, the English wording noted and the figures enable the abstracter to give some idea of the contents of the article.

The classification of moose and their paleontologic and recent history are sketched, including the progressive restrictions in range of the European species in response to human influences. The postwar status of the moose population is given in considerable detail and all of the distributional studies are accompanied by maps. The present range is closely defined and mapped, the location of refuges being a feature of this section. There is a general anatomical description and discussion of variability and races of moose. The principal division of the report--on biology--gives an account of birth and growth of young, food (including scientific names of food plants), and antlers and their development. This last division is in considerable detail, probably

as being of importance in connection with hunting. The interesting point is made that development of the antlers is in inverse proportion to the "bell", the latter being more prominent in younger, and less noticeable in older, males. The biology section goes on to consider movements and spoor and shows that both the tracks and dung of the sexes can be distinguished. There are remarks on the sociology, and on the mental qualities of the animals and a discussion of their predators and parasites. Ecology, including reactions to people and to hunting, protection and restoration (including selective killing and other methods of improving the race) are concluding chapters. There is a bibliography of 149 titles.

Life Histories: European partridge

Green, Wm. E., and George O. Hendrickson. The European partridge in North-central Iowa, Iowa Bird Life (Winthrop, Iowa, 15 cents a copy), 8(2), June 1938, pp. 18-22, 1 fig.

General account, chiefly compiled, but including original Iowa data on population density, winter hardiness, range preferences, and nesting.

Life Histories: Mountain lion

Hibben, Frank C. A preliminary study of the mountain lion (Felis oregonensis [sub] sp.), University of New Mexico (Albuquerque, N. Mex., 50 cents a copy)/318, 59 pp., 1 map., tables, Dec. 1937.
Bul.

Report on a cooperative investigation in New Mexico and Arizona lasting one year, the observer accompanying hunters of the State Game Departments and of the Biological Survey. Lions are hunted at the request of stock associations; 30 of 32 reports "were false; in the other two, we caught the lions." Treating the species as a game animal may sometime conciliate conservationists and sportsmen and also exert sufficient control, but that appears to be something for the future. Mountain lions seldom show aggressiveness toward man. The bulletin discusses habitat, movements, voice, scent stations, breeding, dens, and food habits. Not much evidence of feeding on domestic stock was found; the great bulk of the food was composed of deer, white-tail and mule deer in about equal proportions. The author made an effort to test the claim that predators get largely defective individuals of their prey species and his results seem to favor that hypothesis. Analysis of a considerable number of scats gave frequency indices as follows: mule deer 54, white-tail 28, porcupine 5.8, cottontail 3.9, jack rabbit 2, domestic cow 1.6, and miscellaneous 4.7 percent. There is discussion of the food animals mostly according to specific groups. There is a bibliography.

Life Histories: Muskrat

Smith, Frank R. Muskrat investigations in Dorchester County, Md., 1930-34, U. S. Dept. Agr. Circ. 474 (Supt. of Documents, Washington, D. C., 10 cents a copy), 24 pp., 6 pls., 3 tables, May 1938 (July).

Section headings effectively tell the scope of this much-needed careful investigation; they are: systematic position and range, description, color variation, disposition; muskrat marshes and their population, effects of floods, drought, and cold; sex distribution; activity on the marshes, suspended breathing, burrow and house construction, canals, trails and tunnels, defecating posts; food habits, feeding platforms, vegetable and animal foods; breeding habits, the season, gestation period, size of litters, young; and predators, parasites, and diseases. Bibliography of 23 titles.

Life Histories: Pine mouse

Hamilton, W. J., Jr. Life history notes on the northern pine mouse, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 19(2), May 1938, pp. 163-170, 3 photos.

Notes on measurements, weights, molts, burrows, nests, habitat, food, reproduction, numbers and their fluctuations, and enemies, parasites, and diseases. Bibliography of 14 titles.

Life Histories: Pocket mice

Scheffer, Theo. H. Pocket mice of Washington and Oregon in relation to agriculture, U. S. Dept. of Agriculture Technical Bul. 608 (Supt. of Documents, Washington, D. C., 10 cents a copy), 15 pp., 5 pls., 1 fig., 3 tables, March 1938 (May).

The mice of the genus Perognathus reported on are strictly vegetarian and sometimes do noteworthy damage to seed plantings and to ripening grain. Besides data on food habits and economic status, information is given on distribution and habitat, physical characters, disposition, daily and seasonal movements, shelters and burrows, breeding habits, and natural enemies.

Life Histories: Sea otter

McLean, D. D. Southern sea otter on Pacific Coast, Associated Sportsman (950 Pacific Bldg., San Francisco, Calif.), 5(5), May 1938, pp. 6-7, 2 photos.

Decline in population on the California coast, an estimated 200,000 having been killed between 1786 and 1868. About 1890 they became so scarce that hunting was no longer profitable and for some time thereafter continued to decrease. Localities for recent reports are given, a "large group was discovered below Carmel the latter part of March of this year." [It is to be hoped these can be given protection.] Notes on habits, life history, and value of the fur.

Management: Bears in National Parks

Cahalane, Victor H. National Park Service bear problem, Planning and Civic Comment (901 Union Trust Bldg., Washington, D. C.), 4(1), Jan.-March 1938, p. 32.

Feeding of bears by tourists has resulted in hundreds of cases of human injuries in addition to much property damage, and in consequence the National Park Service has adopted a regulation forbidding all feeding of bears by visitors to the Parks. Repelling with electric fences, trapping and transfer, and as a last resort, shooting are methods used in the case of bears that become dangerous--as a rule only those spoiled by pampering and thus losing respect for human beings. With public cooperation, the normal relationship will be restored. "Then bears will be bears and not racketeers."

Management: Bobwhite

Wilson, Kenneth A. Quail management in Maryland, Maryland Conservationist (511 Munsey Bldg., Baltimore, Md.), 15(2), Spring 1938, pp. 7-9, 27-29, 1 photo, 5 tables.

Summary of 27 months' experience on a Farm Security Administration project, earlier reports on which have been abstracted in WILDLIFE REVIEW Nos.: 5, Sept. 1936, p. 15; 7, Dec. 1936, pp. 23-24; and 9, July 1937, p. 23. Description of tract and discussion of results as to food habit studies, feed patches, plant transition studies, seed collecting, and census. The quail population increased 382 percent and the carrying capacity improved to a bird to 7 acres in contrast with the original 1:35 ratio. Population densities are compared for different types of environment. The tables give details of the food habit study and of the census and list quail food plants of different types of soil. The author's summary is: "It was found that: (1) On the Eastern Shore of Maryland submarginal land is especially well adapted to multiple use conditioning because so much of one work dovetails into that of the other. Ditch drainage that creates better forest growing conditions likewise creates livable habitats for quail and other wildlife. Cultivated strips of land that grow food for quail also provide fire protection for the forest. Forest thinnings that release timber trees also release game food-producing trees and shrubs. (2) The provision of good drainage and substantial fall and winter food contributed more than anything else to the present increase of quail. (3) Where optimum escape cover exists, other things being equal, predator control is not necessary. (4) Land cultivation increases the food supply of hawks, owls, and other predators in the form of mice. (5) Plant transition from cultivated land to broomsedge is three years in badly acid soil and four years in clay. (6) From five to six years following broomsedge an understory of panic grasses, paspalums and partridge pea produce some fall and winter food for quail. (7) Well-drained, sandy soil supports abundant quail food-producing legumes, acid soil does not. Partridge pea is the only legume that grows abundantly in acid soil. (8) Partridge pea grows and produces seed equally well in heavy sour soil or light sandy soil; pure stands

produced 330 lbs. of clean seed to the acre. (9) Ninety-two per cent of all the quail lived around cultivated land. (10) The following proportions of submarginal land are capable of supporting a winter population of one quail for each 7 acres: pine and mixed hardwoods, 72 per cent; swamp woodland, 10 per cent; broomsedge field, 8 per cent; brushland, 5 per cent, and fallow land, 5 per cent."

Management: Burning

Conway, Ralph C. Marsh burning, Wisconsin Conservation Bul. (State Conservation Dept., Madison, Wis.), 3(7), July 1938, pp. 9-10.

Fires may destroy much wildlife from deer to fish, reduce winter cover, and change plant succession sometimes unfavorably. "The statement is made that controlled burning is used to improve game range. This is actually the case in some sections of the country but not on all types of cover found there, nor are large blocks of country burned even when fire is considered beneficial. Such burning must be light and be handled by experts. The Wisconsin Conservation Department recommends that as little game cover and food be burned as possible at any time and that when some burning is necessary, that every possible precaution be taken to limit the fire to the area intended."

Management: Erosion control in relation to wildlife

Davison, Verne E. Fitting wildlife into a practical general farming program, Virginia Wildlife (Blacksburg, Va.), 1(9), May 1938, pp. 2, 7, 1 photo.

The need to improve severely eroded areas with vegetation gives opportunity for guidance advantageous to wildlife. Whatever the factors adverse to wildlife may be, they can be at least partially offset by the production and protection of soil-stabilizing vegetation. Year round facilities are required. Often only field borders can be spared for the work but they have the advantages connected with edge and may be important for their length even if not great in area. Lespedeza sericea, a perennial, and the annual Kobe and Korean lespedezas, browntop millet, Bosc's paspalum, and partridge pea recommended for such edge plantings. Suggestions are given also for the improvement of woodland margins, fence rows, terrace outlets, and ponds. Plans for wildlife rehabilitation in connection with erosion control must be simple, practical, and economical.

Management: Farm game

Morton, James N. Wildlife in the farm program, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, Pa., 10 cents a copy), 9(2), May 1938, pp. 4-6, 30, 3 photos; 9(3), June 1938, pp. 4-7, 32, 4 photos.

Recommendations intended to facilitate cooperation between sportsmen and farmers in improving conditions for wildlife on farms. Part 1 shows that much of the game sought by hunters is dependent on farm practices and that there is general opportunity for making farms more productive of wildlife. Good results can be obtained without expenditure merely by refraining from doing things that are detrimental, "such as burning pastures, cutting all growth along fences and gullies, grazing all of the woodlot," and so on. The kinds of cover are defined and there are suggestions on producing food and cover. The value of wildlife and the usefulness of cover in checking erosion and in beautifying the farm are emphasized. The protection of nesting birds during harvesting, principally by use of flushing bars is urged.

Part 2 is devoted largely to suggestions as to planting to produce food and cover, including feed patches. Grazing in woodlots should be restricted or eliminated and damaged woodlots improved by planting or by sparing useful species. Emergency cover of stones, brush, discarded farm equipment, etc., can be installed while the growth of planted coverts is proceeding; numerous suggestions are made. There are sections on winter feeding, on refuge areas, and on the control of cats and dogs. The summary includes a plea for cooperation between sportsmen and farmers.

This material has subsequently been assembled in the form of an attractive 40 page booklet with cover as Bulletin 16 of the Pennsylvania Game Commission.

Management: Fence rows

Edminster, Frank C. The farm fence in wildlife, American Wildlife (Investment Bldg., Washington, D. C., 25 cents a copy), 27(2), March-April 1938, pp. 38-39, 45-46, 1 map, 3 tables.

In general, farm fields lack year-round shelter; opportunity for improving cover lies mainly in fence rows. Shrubby fence rows harbor birds of value in consuming insects and weed seeds, act as barriers to soil erosion, serve as windbreaks, and produce wild fruits, some of which are gathered for home use.

"Clean farming" is continued not so much for proved utility as because it is fashionable. Reversing the trend is a problem in education, namely to make it "good form" to maintain hedgerows. Studies of environment in relation to the pheasant population in Seneca County, N. Y. showed that land with shrubby fence rows had materially greater carrying capacity than "clean farmed" areas. Authors are quoted to show similar effects for quail in Texas and California, and the Hungarian partridge in Michigan. Woody vegetation will come into undisturbed fence rows by natural processes, but may well be planted to hasten realization of benefits. Factors that should be taken into consideration in selecting planting material are mentioned under 12 headings and a table suggests woody plants suitable for the Northeastern States; gives information on their moisture and soil tolerances, height, and period of availability of fruit; and mentions kinds of wildlife the plants benefit. Bibliography of 6 titles.

Management: Forest wildlife

Authors. Northern Region News (U. S. Forest Service, Missoula, Mont.), Monthly news sheet, mimeographed.

In most, if not all, U. S.Forest Service Regions, news organs are circulated which often contain items of interest to wildlife managers. Through the courtesy of Evan W. Kelly, WILDLIFE REVIEW has been supplied with nearly a complete set of that for Region 1 from March 1937 to date, from which the following abstracts have been made.

Elk planted on Deerlodge Forest. George M. Fisher. March 1937, pp. 39-40. Seventy-five ear-tagged elk were transported by truck with little loss. The point of particular interest is the agreement between all parties concerned which specifies the maximum number of elk that shall be permitted to live on the area, and vests in the Forest Service discretion in limiting the herd to some other level. The agreement provides also for adjudication of depredations by all parties of interest and for hunting when permitted under the limited license system.

Game salting notes on the Upper Selway. G. W. Case. May 1937, pp. 35-37. A later report on this subject published in The Journal of Wildlife Management is abstracted elsewhere (p. 35) in this issue of WILDLIFE REVIEW. Certain details in the preliminary report, however, may well be cited. The main objectives were to meet the needs of deer and elk for salt and to use the mineral as a control on distribution of the animals in an effort to prevent overbrowsing, summer use of winter range, erosion started by concentrations of animals, and the spread of diseases and parasites. Some 36,000 pounds of salt was distributed during the first season of trial in 100 and 200 pound lots. Ninety-seven elk at one station consumed 200 pounds and probably would have taken more. The experiment resulted in satisfactory decrease in use of winter range and apparently in lessened infestation by ticks, scabies, mites, and throat bots.

Notes on mule deer forage. Robert F. Cooney. May 1937, pp. 38-39. Winter foods on the Beartooth Division of the Custer Forest. Ceanothus velutinus is highly important and apparently very resistant to damage by browsing. Juniper, fir, and sagebrush also are of outstanding value. In March a prickly pear (Opuntia) was freely eaten.

Results of artificial feeding. Richard M. Bond. June 1937, p. 51. Excerpts from his report on bighorn sickness in Glacier National Park to the effect that artificial feeding may result in pauperization, decline in health, spread of disease, and increase in predation.

Comments on artificial feeding. David J. Maclay. June 1937, pp. 51-52. A case in point. White-tailed deer in the Kaniksu National Forest were completely pauperized by artificial feeding. They hung around the feeding grounds, scarcely foraged for themselves, and rapidly lost condition. About 15 percent died of endotoxemia. They were literally killed by kindness and the conclusion is drawn that wild animals should not be artificially fed except as a last resort.

The case of the otter. David J. Maclay. August 1937, p. 34. Studies in the Selway Basin, Idaho, showed the food to consist to a greater extent of aquatic insect larvae and crayfish than of true fishes.

Too many elk. A. B. Hatch. October 1937, pp. 34-35. Summer range is adequate but winter range is deficient in area, and also in variety and quantity of food. Concentration produces unsanitary conditions at licks, brings on a disease through feeding on too coarse browse that causes loss of teeth and death. Losses on the winter range are increasing. The only solution of the difficulty is herd regulation.

Grouse. Robert F. Cooney. December 1937, pp. 29-30. Notes on distribution, number of eggs and young, and causes of mortality of dusky, Franklin's, and ruffed grouse in Idaho. Sheep grazing did not seem unfavorable. Notes on foods of which the most important were grasshoppers, huckleberry leaves, and larch needles.

Elk and deer foods and feeding habits. R. M. De Nio. March 1938, p. 31. Abstract of paper presented at the Third North American Wildlife Conference, February 1938, which will be available in full in the Transactions. The studies on which the report is based were carried on in the winter game ranges of 17 national forests with a gross area of nearly 27 million acres and a population of 109,000 deer and 37,000 elk. Data collected by direct observations in band trailing, clipping and study plots, and stomach-content analyses show that no fewer than 225 forage species are utilized. A total of 447 deer and elk stomach-content samples have been collected in the Region over a period of four years, representing every big game area on the 17 national forests. Of the 447 samples collected, 59 deer and 53 elk stomach-content samples have been analyzed in detail. Those of 53 elk show that December is the month in which the consumption of grasses by elk decreases and that of shrubs and conifers increases. In April shrubs and conifers decrease sharply in the diet and grasses correspondingly increase. In comparing the analyses of the food of 53 elk and 59 deer based on quantity by weight, the consumption of shrubs by deer in winter is 52.53 percent, while that of elk is only 15,46 percent. Conifers taken by deer are 35.61 percent compared to 11.75 for elk, and grasses 3.04 percent for deer as against 56.58 for elk.

A note on marten management. J. A. Parsell. June 1938, p. 25. More males are trapped in the early, and more females in the late, part of the open season. In default of closure, which is recommended, trapping during only the first month of the season as at present defined should be adopted to maintain productivity.

Management: Forest wildlife

Pederson, F. C. The maintenance and development of wildlife as a forest resource, Virginia Wildlife (Blacksburg, Va.), 1(9), May 1938, pp. 6-7, 1 photo.

In praise of forests in relation to wildlife, this article asserts that the forested and wooded lands of Virginia "provide a major part of the habitat for our remaining wildlife, which for the purpose of this discussion includes

upland game birds and those mammals important for food, fur, and hunting. The forest is a favorable habitat for wildlife in Virginia because for practically all species it furnishes the three prime essentials: food, breeding grounds, and protection from enemies and the elements." The paper points out the value to quail of acorns and of the seeds of pines, sweet gums, and of legumes which grow in the woods. "Ruffed grouse and wild turkeys derive a still greater part of their food from the forest." Deer food consists "almost wholly of the products of forest land." Quail require "forest cover." "Except in special areas, hunting and fishing can be coordinated with other forest-land uses without serious conflict." "About 64 percent of the total land area of the State is essentially forest land." Much of this is in private hands so "the problem of wildlife in Virginia must of necessity be primarily concerned with the propagation and protection of game resources on privately owned forest lands." "Adequately managed and protected forests and woodlands contribute so much to wildlife welfare, while forest exploitation and destruction depletes it." "Unfortunately forest exploitation is still the rule x x x more and more wildlife disappears from lands which it once occupied."

Individual land holdings are often too small to afford satisfactory units of management for mobile game, hence cooperative arrangements between groups of landholders are desirable. With State assistance, returns would be facilitated through the collection of fees for hunting privileges.

Comment. All of this sounds orthodox and praiseworthy but everything depends upon definitions of the principal terms involved in the argument. The author defines wildlife as game and fur species. But what are forests? They are popularly understood as rather dense growths of trees and technically defined as "areas whose principal crop is trees."

Now it is well understood among ecologists and wildlife specialists that wooded areas become less inhabitable for wildlife in proportion to their density, that is to the extent that they become real forests. Bobwhite and cottontail are the most important game species of Virginia but they are not forest dwellers. This fact materially reduces the significance of the claim that "the forested and wooded lands of the State provide a major part of the habitat for our remaining wildlife." The claim cited is one frequently made by foresters, but if they have in mind open woodlands and brushy clearings, only to which it can apply, these should be specifically named and the term forest avoided. As a rule tree growths managed for maximum timber production are unfavorable for wildlife.

The author's comments on the value of forests in supplying food for wildlife manifestly apply to open stands. The woodlands where quail obtain pine seeds are of a very open type and must be kept open to remain attractive to quail. The legumes which grow in woodland, while somewhat shade tolerant, are soon suppressed by dense growth; woods burning on quail preserves has as one of its main objects release of these legumes from smothering growths.

True forests, while apparently all cover, do not provide the close-to-the-ground type that is so important to many forms of wildlife. To aver that forest exploitation depletes wildlife is to ignore the effects of lumbering in such States as Pennsylvania and Michigan where great increase in deer (and

presumably lesser creatures) was the response to the extension of clearings, slashings, and burns, and where now forest growth, reducing the habitable area and the food supply, is bringing about by starvation, or causing man to bring about, decrease in the deer population.

The foresters no doubt favor wildlife, they no doubt mean well, but they should not make unsound claims as to forests in relation to the welfare of wildlife nor forget that two things (in this instance trees and wildlife) cannot occupy the same space at the same time. Wildlife must have space, light, ground cover, and in a majority of cases food readily accessible from the ground. Unrestrained, trees kill these things and to assure them, trees must be in places discouraged or eliminated, not everywhere encouraged as the prime crop. This is not to say that wildlife must be favored in a given area, for as the author contends, economic considerations as a rule must control; if wildlife does not promise sufficient returns, it will not be especially encouraged. That situation is admitted but to be equally candid with wildlife proponents, foresters should refrain from implying that forests, as such, necessarily benefit wildlife; the condition may be and often is quite the reverse.

Management: Forest wildlife

Taylor, W. R. Fauna and forestry in Great Britain, Forestry (Oxford University Press, Amen House, E.C. 4, London, England, 7 shillings 6 pence a copy), 11(2), 1937, pp. 81-84.

Review of the effects of man upon the fauna including extirpations, reductions, and introductions. Notes on animal depredations in forests with the comment, "Surely the most rational remedy lies in an attempt to adjust the relative numbers of the helpful predatory species to the non-predatory." Foresters should so regulate the wildlife populations in forests as to be good neighbors; nevertheless, they may save certain threatened species from extinction.

Management: Game and hunting in Finland

Klemola, V. M. Finnish game and hunting, Silva Fennica (Society of Forestry, Helsinki, Finland), 40, 27 pp., 5 maps, 5 tables, 1937.

Account of game species, their distribution, and prevalence. The mallard forms half of the waterfowl population and the black grouse predominates among upland game birds. Species are grouped as they are attracted or repelled by cultivation and other human activities. The brown hare and partridge, both newcomers, are most important among game species favored by cultivation, and the ptarmigan, capercailzie, and hazel grouse among those driven away. Rational hunting is not destructive to the fauna but unfortunately most of the hunting, both past and present, is irrational and constitutes plundering of the fauna. The record in extermination and near extirpation reads something like that of the United States--the beaver extinct, and the marten, lynx, otter, bear, wolf, and wolverine seriously threatened. The introduced muskrat is spreading despite intensive trapping. It is regarded

as an economic asset, however, not as something to be destroyed as in Great Britain. Game zones, correlated with vegetation and climate, and their inhabitants are discussed in some detail. Methods of hunting both primitive and modern are described. The harvesting of game and fur as an economic factor was of decisive importance in earlier times and is still depended upon to some extent, although game on the whole has greatly decreased. Statistics are given on the take of fur animals including in a Table the number of individuals of 6 species reported in representative years since 1880. [When the take can be so stated in numbers of 55 or under as for 4 species (bear, wolf, lynx, and wolverine) in all years since 1920, it would seem that the animals concerned are near extinction.] The bag of game birds, itemized for 1933-34, seems very large. The monetary value of game is estimated at from 30 to 40 million Finnish marks ($756,000-$1,008,000) annually. The State compensates for damage by bear and elk and pays bounties on several fur animals, the bulk of the total amount for seals. Private organizations for game protection are growing in importance. Under a law of 1934, fees paid by members to the State are expended for game preservation. Members are entitled to hunt only in areas for which they have permits. The work of the associations (about 200 in number) is conducted by local boards, which have the cooperation of advisors associated with an inspector of hunting in the Ministry of Agriculture. The present game laws are described and their prohibitions and closed seasons tabulated. Six mammals and 7 birds are given total protection. The general text of the article abstracted is in English and a summary in Finnish.

Management: General

Anon. North Carolina Wildlife Conservation (Division of Game and Inland Fisheries, Raleigh, N. Car.), 2(6), June 1938, 14 pp., 6 figs.

Brief general account of the ruffed grouse with argument from cyclic fluctuations for discretionary game regulation by the departments of conservation. An essay entitled "Wildlife needs action, not words," points out the essential failure of laws, vermin control, refuges, and propagation to check the downward course of wildlife and emphasizes the urgent need of actual field work in improving environment and of getting the full cooperation of landholders. There are also some interesting notes on beneficial food habits of small birds.

Management: Harvesting deer

Hill, R. R. Minnesota's deer problem, Minnesota Conservationist (Dept. of Conservation, St. Paul, Minn., 15 cents a copy), 57, May 1938, pp. 9, 19, 22-23.

In reply to a charge that Minnesota deer are being extirpated by hunting, this article relates to the Superior National Forest and its conclusions are not held to be applicable elsewhere. "Good game management must be based upon facts as they exist in the various areas to be managed." On the Superior Forest the deer population is from 60 to 70 thousand; fawns are about a third of the total, so the annual increment is considered to be about 20,000. Some 12,000 deer die in the winter yards, 4,000 or 6 percent of the total are

removed by hunting, and the remaining 4,000 are unaccounted for. Hunting as at present carried on is not decreasing the herds.

Management: Hungarian partridge in Europe

Swanson, Gustav. The Hungarian partridge, Minnesota Conservationist (Dept. of Conservation, St. Paul, Minn., 15 cents a copy), 57, May 1938, pp. 12, 28-30, 1 illus.

Notes on old-time methods of hunting the species in Europe and on modern systems of management there. The British "Euston system" essentially one to give additional protection to the eggs, and the French pairing and feeding methods for improving egg production, are described.

Management: Miscellaneous

Anon. State of New York, Conservation Department (Albany), Twenty-seventh Annual Report. For the year 1937 (1938).

Pages 261-298 assigned to the Bureau of Game and 298-302 to the Bureau of Game Refuges are of most interest to wildlife managers. A great deal of the former section is devoted to research but the miscellaneous character of the report in general makes advisable its allocation to a "Management" heading. Among inclusions is the 8th report of the New York Ruffed Grouse Investigation. Food habit investigations were stressed. Grasses and sedges were found to be leaders among vegetable foods of the chicks and also of adults in summer and fall, and equally unexpectedly popple at the bottom of the list of the first ten winter staples. Tables name the ten ranking food plants for each season and the parts of the plants most commonly used. [The words "preferred" and "unpalatable", used in describing certain foods, are, as a rule, inexact. To a great extent, abundance and availability rule food consumption. The factor of familiarity also should be considered as birds often do not take readily to unaccustomed foods although upon further acquaintance they may accept them freely.] Cyclic phenomena were of mixed import; reproductive potential and sex ratio have continued about the same as in previous years. Apparent correlation between grouse declines and certain weather conditions is indicated but not definitely accepted as a cyclic factor. There is discussion of mortality among nestling, broodling, and adult grouse, and of diseases and parasites, none of serious importance. Pathological examinations of wildlife are tabulated to show the groups and individuals (1635) autopsied, and the causes of death. A table of post-mortem findings of both adult birds and chicks from game farms and another of wild deer also are given. The principal parasites and diseases are briefly discussed. Developments in the experimental propagation of grouse, pheasants, and ducks are described. Deer studies, game habitat surveys, planting of food and shelter trees and shrubs, slashings in relation to forest wildlife, a feed patch seed mixture, propagation, restocking, the take of game and fur, and the development of refuges also receive attention.

Management: Miscellaneous

Anon. North Carolina Wildlife Conservation (Division of Game and Inland Fisheries, Raleigh, N. Car.), 2(5), May 1938, 14 pp., 3 figs.

Colonization of 3,000 acres of marsh in Currituck County, N. Car. with "black" muskrats from Maryland; experimental forced feeding of seeds of Cassia tora resulted in diarrhea in bobwhites, and diarrhea and death in an English sparrow; white rats and cotton rats refused the seeds when proffered alone or mixed with other foods; after 10 days of soaking the softened seeds were eaten by cotton rats; several instances are given of the value of birds in locally controlling insect pests--quail vs. bean leafbeetles and potato beetles; blackbirds vs. plant lice; crows vs. tobacco worms and cutworms; notes on reasonable control of blue darters and on damage done by roaming dogs.

Management: Otter

Yeager, Lee E. Otters of the delta hardwood region of Mississippi, Journ. Mammalogy (Wm. H. Burt, University Museum, Ann Arbor, Mich., $1.00 a copy), 19(2), May 1938, pp. 195-201, 1 table.

Description of region; history of otter capture, including a table showing methods of taking of 169 individuals; notes on den trees and dens; habitat preferences; reactions to floods; management by protection, stream and lake bank protection and restoration, and conservation education.

Management: Planting for wildlife; hawthorns

Deck, Raymond S. The hawthorn--friend of the sportsman, Country Life and The Sportsman (Philadelphia, Pa., 50 cents a copy), 74(1), May 1938, pp. 72-73, 130-133, 5 photos.

A popular article embodying information on the value of Crataegus in providing food and cover, with special notes on a few species with persistent fruits.

Management: Range

Cully, Matt. Grazing habits of range cattle, The Cattleman Coliseum Bldg., Fort Worth, Texas), 24(9), Feb. 1938, pp. 19-23, 3 photos, 1 table.

Remarks on preferences among food plants and the table summarizing them in convenient form may be useful to those faced by problems of competition between cattle and wildlife.

Management: Range

Hatch, A. B. Stockmen, sportsmen to cooperate, National Wool Grower (509 McCormick Bldg., Salt Lake City, Utah), 28(5), May 1938, pp. 9-11, 2 photos.

Stockmen are worried about the consequences of the Federal Aid to Wildlife Restoration Act. The author thinks that differences between the cattlemen and sportsmen are more imaginary than real and believes that with a little conciliation from each side, both wildlife and livestock will benefit. At present the Forest Service controls most of the summer range and the stockmen about 95 percent of winter range suitable for game. Wildlife can be brought

back in satisfactory numbers without injury to livestock and it is the task of the stockmen to convince sportsmen of this fact. On the other hand, wildlife restoration, as in the case of the beaver, for instance, through protection of water supplies, will benefit the livestock industry. Conservation and development of watering facilities in arid districts will be a boon both to wildlife and domestic stock.

Management: Salting to localize big game

Case, George W. The use of salt in controlling the distribution of game, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(3), July 1938, pp. 79-81, 1 fig.(map), 15 tables.

Notes on natural licks in the Clearwater Basin, Idaho and on experiments in salting. It was found possible to detain elk and deer on summer pastures and thus protect depleted winter range. Tests revealed that the animals utilize salt to which certain strong flavors were added and this is thought to show that medication to control parasites and diseases may be feasible.

Management: Stocking

Grimmer, W. F. 1938 experimental game birds, Wisconsin Conservation Bul. (State Conservation Dept., Madison, Wis.), 3(6), June 1938, pp. 3-6, 1 photo.

Notes on work with several kinds of game birds of which Mongolian pheasants have been extensively, and chukar partridges locally, established. Work with other forms farthest advanced involves the melanistic mutant of the ringneck pheasant, a cross between the Japanese green and English blacknock pheasants, Reeves, and the Nepal Kaleege pheasants.

Management: Stocking muskrats

Storer, Tracy I. The muskrat as native and alien: a chapter in the history of animal acclimatization, California Fish and Game (Ferry Bldg., San Francisco, Calif.), 24(2), April 1938, pp. 159-175, figs. 57-62.

Reprint with considerable additions of the article "The muskrat as native and alien" abstracted in WILDLIFE REVIEW, No. 11, February 1938, p. 29.

Management: By the TVA

Richards, Edward C. M. The future of TVA forestry, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 36(7), July 1938, pp. 643-652.

The author resigned as head of the Forestry Division of the TVA after serving from the beginning, a period of about 4-1/2 years. He "criticizes certain policies and the lack of others by the Board of Directors, while upholding the work in forestry, soil erosion control and wildlife management that has been done." A section of the paper amounting to somewhat more than 2 pages is devoted to "Wildlife Management and Fisheries." The author says

that, "The TVA has only agreed to do anything at all for wildlife and fisheries because of strong pressure. In order to 'shorten the power yardstick' and show that its power program is a sound, profit-making business enterprise, it is trying to cut expenses, especially permanent operating expenses. Outside and inside pressure insist upon the wildlife work, however. The TVA consequently does as little of it as possible; just enough to east that pressure." There are other remarks on evasion of obligations in research and management that will be of interest to readers of WILDLIFE REVIEW.

Management: Trapping deer

Ruff, Frederick J. Trapping deer on the Pisgah National Game Preserve, North Carolina, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(3), July 1938, pp. 151-161, 1 pl., 4 figs.

Author's abstract: "Trapping adult deer on the Pisgah National Game Preserve was initiated in 1928 in order to obtain deer for restocking purposes, and incidentally to help reduce increasing numbers. The trap is, in many respects, similar to ordinary cage- or box-traps used in live-trapping, with the added feature of holding an animal in comparative darkness. Materials for construction, cost between $15 and $16, plus $2 for materials for the shipping crate. The 164 traps set in clearings between October 1, 1937 and April 15, 1938, where they were readily accessible by motor roads, netted a total catch of 253 deer. Two men were able to operate from 60 to 75 traps, including the crating of captured animals, setting traps, and baiting with apples and rhododendron sprigs. Crated animals were shipped by rail or truck. Losses due to trapping and shipping averaged less than 1 percent." The trap is fully illustrated both by photographs and drawings, its construction described and a bill of materials provided.

Management: Water supply for desert quail

Rahm, Neal M. Quail range extension in the San Bernardino National Forest--Progress Report, 1937, California Fish and Game (Ferry Bldg., San Francisco, Calif.), 24(2), April 1938, pp. 133-158, figs. 41-56, 5 tables.

Statement of the essentials of quail range; water is usually the limiting factor in southern California. Account of establishment of water supplies as a means of encouraging utilization of range. The area selected on desert north slopes of the San Bernardino Mountains is one that had been tested for its agricultural possibilities and abandoned. Description and illustration of 2 types of watering devices and statistics as to their consumption of water. They were successful in attracting and holding quail and may be an aid in increasing the extent of public shooting grounds. The mountain quail is too easy a mark and development of its range is not recommended. Notes on habits of quail and predators.

Pollution

Thomas, Charles W. Coast Guard fights pollution, Outdoor America (1167 Merchandise Mart, Chicago, Ill., 10 cents a copy), 3(6), pp. 6-7, April 1938.

Functions of the Army Engineers, Coast Guard, and Customs Bureau in combating pollution, and account of a campaign with State cooperation in southern California. 115 out of 121 cases of oil and refuse pollution solved; penalties assessable; methods of investigation. "The harbors and coast of southern California are the cleanest they have been in many years."

Predation

Breckenridge, W. J. A review of predator control, Minnesota Conservationist (Dept. of Conservation, St. Paul, Minn., 15 cents a copy), 57, May 1938, pp. 10-11, 23-26, 3 photos.

Essentially a compiled account, the sources of which are given in a terminal bibliography of 12 titles. Most hunters advocating predator control "do not seem to appreciate what tremendously complex and powerful natural forces they are opposing in trying to bring about an unnatural, Utopian situation where game is continuously superabundant. They do not look ahead for the less evident, ultimate results of such short-sighted moves as 'vermin' extermination. They do not stop to figure out that if they kill off all the hawks and owls that prey to some extent on game species, they are at the same time removing effective natural checks on ground squirrels, mice, rabbits and like forms that in turn destroy cover for game birds." "And food" should be added. The author cites a case of general predator control in California where no hunting was allowed and the quail population steadily decreased. Apparently this was due to increase in ground squirrels that devoured the quail eggs. Attention is given to the bounty system and Pennsylvania's adverse report is quoted. "Improvement in the environment of animals is much more effective in increasing game populations than are extreme measures of predatory animal control."

Predation

Gordan, John W. Winged killers, American Field (222 W. Adams St., Chicago, Ill., 20 cents a copy), 129(21), May 21, 1938, pp. 619-620.

WILDLIFE REVIEW has ignored a number of articles on "vermin" in the sporting press because, as a rule, they are obvious products of prejudice and error, but the contrast between Breckenridge's reasonable treatment (abstracted above) and the present citation, read the same day, indicated the desirability of breaking silence.

We read in the article on "Winged killers" that, "From the viewpoint of the hunter and conservationist all hawks are bad." This is so broad a misstatement that it would be disclaimed by a vast majority of those who are entitled to be called conservationists. In fact, it is doubtful whether a single genuine conservationist could be found who would agree that "all hawks are bad." The author further states that "the sharp-shinned hawk is without a single virtue" and "there is nothing that can be said in its favor." The truth is, however, that even this bird-hawk feeds to some extent on mice and insects. After these extreme remarks on the sharpshin, the author writing of all the species of the darter group, says that the goshawk "has the worst reputation of the three"--i.e., worse than having not a single virtue. Referring to the diet of the red-shouldered and red-tailed hawks, the writer states that

"game birds predominate when they are available." This might be true if stated as when proportionally available, but not under any other circumstances. On the average, about one meal in 50 of these hawks includes a game bird.

The snowy owl is said to be "almost as bad as the great horned" but records of stomach analysis do not bear this out. The author adds that "The depredations of this owl among the game birds particularly has always resulted in a heavy bounty being placed on it and it is usually the case that it is by far the most valuable predatory creature in the wilds." Presumably this means valuable to the bounty hunter, but the whole sentence is unfounded; according to the latest available summary (Leaflet BS-24, 1935) of bounty laws, bounties could legally have been paid on snowy owls in only one or two of all the United States. Referring to the screech, short-eared, and long-eared, owls the writer says that "they all kill game birds plentifully and while they do eat many small rodents, such as mice, moles, and rats, this fact cannot be advanced in their defense." The first part of this statement is untrue and the second shows only prejudice. If the economic worth be not taken as a guide for man's policies toward wildlife, there is no sound standard left. If harm is to be reckoned against, why should not good be counted in favor, of a predator? None are wholly bad or entirely good. If creatures are to be condemned for their shortcomings and contrasting evidence not considered in defense, then no living thing can escape the fatal sentence.

Summing up, the author says, "Indeed, nothing can be said which will justify the toleration of any of the winged killers. x x x They destroy game, both furred and feathered, preferring such food to the vermin which they might destroy instead." For sublime error the latter sentence can hardly be beat, while the former is so anachronistic in its point of view as to be absurd; witch-burning today would not be more so.

Apparently this tirade was inspired by the author's seeing a hawk kill one of a covey of ruffed grouse, but it was in a place where no "grouse had ever been seen before," and which he visited reluctantly, not expecting to find any of the birds. Evidently it did not occur to him that the grouse must have been thriving and increasing to occupy new territory in the face of predators. That is the trouble, there is little thought or judgment concerned with these outbursts and they should be rejected on sight by editors as not being in accordance with fact and with modern more sensible and realistic views on predation.

Predation: Methods of gray fox

Nelson, A. L., and C. O. Handley. Behavior of gray foxes in raiding quail nests, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(3), July 1938, pp. 73-78.

Field experiments in Virginia with 8 transplanted nests, described with particular reference to approach of the animals, degree of interference with nest structure, and evidence as to egg eating. There was little disturbance of the nests and seldom any fragments of shell left to tell of the robberies which were completed in from one to a few visits.

Predators: "Vermin" control

Deck, Raymond B. Guest book of vermin. Hitting the happy medium in predator control, Country Life and The Sportsman (Philadelphia, Pa., 50 cents a copy), 73(6), April 1938, pp. 37-39, 103-106, 5 photos.

A plea for moderation in "vermin" control. "It's becoming clearer every day now that the safe, wise way to increase the game supply is to ease up on killing vermin and put our energies on improving cover and food-supplies instead." Cats should be licensed as a step toward elimination of feral individuals. "Super-controlling vermin has never yet forestalled the down cycles of game."

Predators: Wolf

Olson, Sigurd F. A study in predatory relationship with particular reference to the wolf, Scientific Monthly (Science Press, Lancaster, Pa., 50 cents a copy), April 1938, pp. 323-336, 6 photos, 3 maps.

Predators have been eliminated without regard for the influence they might have upon the balance of life in the communities of which they are a part. Game refuges have often been administered as herbivore sanctuaries so that primitive conditions under which hoofed game retains its natural alertness are now mostly lacking. Probably more wolves remain in the Superior National Forest in northeastern Minnesota than in any other part of the United States. Despite popular belief that wolves live upon deer, the food in summer includes grouse, mice, voles, marmots, fishes, snakes, insects, and some vegetation. In fact almost anything that crawls, swims, or flies may be included in the diet. In winter when most of the small mammals are in hibernation and other items of the summer food unavailable, the wolves are forced to feed almost entirely upon deer and snowshoe hares. When food is scarce, three or four meals a month will keep a wolf from starving.

Conditions of the Superior National Forest environment, hunting habits of the wolves, and organization and range of the packs are described. [A previous paper on this last topic was abstracted in WILDLIFE REVIEW, No. 13, March 1938, p. 10.] The author contends against the belief that wolves kill wantonly. He interprets apparently excess killing when opportunity affords as an instinctive first step in a process of building up a reserve food supply. Carcasses not consumed at first under natural conditions would be revisited and eaten later. The author believes that the poisoning of carcasses and setting traps around them has instilled fear to such an extent that wolves are very reluctant to approach them. Thus control campaigns prevent the animals from eating all of their kills and compel them to kill more than they would if unmolested.

There are about 250 wolves on the area discussed and they kill about 1,500 deer annually. The deer population is in the neighborhood of 20,000 animals, a herd that can stand yearly loss of about 4,000 without diminution of the breeding stock. The presence of wolves in a wilderness area instead of being a hazard is an asset to big game. The majority of the kills are old, diseased, or crippled animals, the elimination of which is a benefit to the

stock and the depredations of the wolves conduce to a desirable state of alertness on the part of the deer. Experience on the Superior National Forest demonstrates that sanctuary can be given to both carnivores and herbivores without danger of decimation of the big game. Bibliography of 20 titles.

Propagation: Care of eggs

Rockwell, M. J. Storing and shipping hatching eggs, Modern Game Breeding (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 8(5), May 1938, pp. 4-5.

Notes on factors affecting viability and how to control them in storage and shipment; description of methods.

Propagation: European partridge

Anon. A diary of the partridge rearing field at Knebworth in 1937, I. C. I. Game Researches (Imperial Chemical Industries, Millbank, London, England), Advisory Leaflet 17, 22 pp., April 1938.

The bulk of this leaflet consists of quotations from a Captain Moser's diary of experiences with partridges from June 13 to August 9. Notes on management of the birds are interspersed with those on mishaps and disappointments. Two of the reasons for reproducing the diary were to hearten gamekeepers and to moderate expectations on the part of employers by showing that difficulties are encountered on the best managed rearing fields. There are paragraphs of suggestions on handling of bantams and partridge chicks of different ages, and coops and runs, on dusting shelters, unhatched eggs, percentage of hatch, foods including ants' "eggs" and substitutes for them, trampling, coccidiosis, and rubber wing bands for marking the birds, besides a general summary of results for the season.

Propagation: Irradiation results

Bissonnette, T. H. Experimental control of sexual photo-periodicity in animals and possible applications to wildlife management, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(3), July 1938, pp. 104-118.

Review of experiments with juncos, crows, starlings, ferrets, etc., in activating the sexual cycle by increasing "length of day" by artificial lighting, followed by more detailed accounts of similar work with the bobwhite, ringneck pheasant, and raccoon. "It is evident that control of length of day and of type of food are potent methods of controlling the times at which animals may breed and of increasing or prolonging their productivity." Extensive bibliography.

Propagation: Irradiation results

Bissonnette, Thomas H., and Albert G. Csech. Interrupted night-lighting with pheasants, Ecology (Prince and Lemon Sts., Lancaster, Pa., $1.50 a copy), 19(2), April 1938, pp. 181-187.

Arousing sexual activity by increased lighting having been demonstrated, "it became of interest to see what occurs when experimental lighting is stopped and birds x x x returned to normal conditions of day-length after being well started in reproduction by forced lighting." The experiments recorded "show that laying at a reduced rate will continue even after the daily period is reduced by six hours just at the beginning of the normal laying season of pheasants. The infertility of the eggs laid subsequent to the reduction of daily light by six hours per day to the normal daylength for the season was due probably to sexual regression of the males resulting from the reduction."

Propagation: Mountain quail

Caughlin, Pat. H., and Ethel Caughlin. Mt. quail at Baldy Mesa Game Farm, Modern Game Breeding (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 8(7), July 1938, pp. 4-5, 1 photo.

This farm is in the native range of the mountain quail. Success is attributed to that circumstance, to winning the confidence of the birds, and to providing natural cover and foods in the pens. Nevertheless an average of only about 20 eggs a year has been obtained. The birds are kept in groups of 10-15 pairs in each pen. Bantam hens are used to brood the young. The control of lice is important and is accomplished by the use of cooking oil in preference to a powder. First food for the young is cottage cheese from skimmed milk and hard-boiled egg yolk, soon supplemented by a damp mash of 19 percent protein content, and later by grains and greens.

Propagation: Shipping pheasants

Yessler, G. Fred. Merchandising pheasants, Modern Game Breeding (J. A. Gardy Printing Co., 28 W. State St., Doylestown, Pa., 25 cents a copy), 8(5), May 1938, pp. 5-6.

Suggestions as to shipping crates.

Research: Hair identification

Mathiak, Harold A. A rapid method of cross-sectioning mammalian hairs, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(3), July 1938, pp. 162-164, 1 fig.

Author's abstract: "A coating of a solution of celluloid in acetone is placed on a stick of balsa wood. One or more hairs are laid on the sticky solution. Additional celluloid is placed on the hairs and allowed to dry. Sections about .6 mm. thick are sliced with a razor blade and examined under a microscope with transmitted light."

Research: Marking animals for identification

Carmichael, Emmett B. A system of numbering laboratory animals, Science (Lancaster, Pa., 15 cents a copy), 87(2268), June 17, 1938, pp. 557-558, 1 fig., 1 table.

A system of marks consisting of notches, holes, and slits in the ears, clipped toes, and bobbed tails, that has a capacity of 299,999.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-109. Fort Niobrara Game Preserve, Nebraska, by Clara Ruth, 7 pp., 2 pls., April 1938.

Location and purpose; history; occupants as big game, Texas longhorns, smaller mammals, and birds; improvements; miscellaneous features. List of 10 other refuges maintained primarily for big game animals.

BS-110. Status of eelgrass (Zostera marina) on the North Atlantic Coast, February 1938, by Clarence Cottam, 7 pp., April 1938.

Review of previous accounts of the eelgrass wasting disease referring to 8 articles cited in a terminal bibliography. Description of "present" conditions by regions; summary, not optimistic; and account of experimental transplantings from the West to the East Coast.

BS-111. The waterfowl situation: 1937-38, 10 pp., 2 tables, 1 map, April 1938.

Summary of observations by the Federal flyway biologists with map showing courses of their expeditions, on the status of the North American wildfowl population. Moderately optimistic. Reports from cooperating observers (tabulated) indicate improvement.

BS-113. European and American methods of rat control, by E. M. Mills, 6 pp., May 1938.

Descriptions of rat control with special reference to laws and extensive campaigns in Denmark, England, Germany, and France. General account also of rat control and its history in the United States.

BS-115. Cultural and other methods for the control of injurious wildlife, by Donald A. Spencer, 6 pp., June 1938.

Cultural methods are those involving modification of agricultural practices; examples are given. Defensive control is discussed under the heads of scarecrows, repellents, fences, and transfer of offending animals. Aggressive methods are illustrated by the New England field mouse control campaign which is fully described, particularly as to safeguards employed.

BS-117. Protecting orchard trees from deer, by E. M. Mills, 5 pp., 1 pl., June 1938.

Habits of deer calling for control, and repellent devices and substances. These are described under the captions: scaring devices, sprays, fences (electrified and other), asafetida, naphthalene, flashguns, tar-paper cones, and traps.

NOTES AND NEWS

Of interest to wildlife managers is a publication of the U. S. Forest Service, "The distribution of important forest trees of the United States" (U. S. Dept. Agr. Misc. Pub. 287, April 1938 [July]), which contains maps showing the range of 170 species. It may be obtained from the Superintendent of Documents, Washington, D. C., at 35 cents a copy.

A publication on "Forest rights in foreign countries with especial reference to grazing rights" (Sparhawk, Wm. N., U. S. Dept. Agr. Circ. 456, 67 pp., Dec. 1937 (May 1938), Superintendent of Documents, Washington, D.C., 10 cents a copy) while not relating to wildlife will be useful to those interested in forest and range management. The writer insists on the dangers of allowing privileges to become rights and declares that "It is no doubt true that unregulated grazing has been the cause of vastly more forest destruction than commercial lumbering or any other form of timber use."

Carleton College, Northfield, Minnesota, an institution not mentioned in BS-98, "Colleges and universities offering courses in wildlife management," has issued a booklet "Natural history at Carleton College" that describes the facilities and courses of instruction in natural history (including geology, geography, conservation, botany, animal biology, ornithology, and entomology), and lists the faculty and their qualifications. The training is planned as preparatory to specialization for technical or administrative positions in wildlife management, forestry, soil conservation, or other biological services, local or national.

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WILDLIFE REVIEW

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Washington, D. C. No. 16 November, 1938

Biological Survey: Birds of Louisiana

Oberholser, Harry C. The bird life of Louisiana, Dept. of Conservation (New Orleans, La., $1.00 a copy), xii+834 pp., 45 pls. (8 col.), 1938.

Special chapters relate to the migration of birds, and bird protection. The bulk of the book is made up of accounts of species and subspecies known from Louisiana, which, as a rule, contain some descriptive matter, notes on habits, food, distribution, and dates of occurrence. There is also a hypothetical list, an extensive annotated bibliography, and a full index.

Classification: Lespedeza

Pieters, A. J. The native American lespedezas, Soil Conservation (Supt. of Documents, Washington, D. C., 10 cents a copy), 4(3), Sept. 1938, pp. 84-86, 6 figs.

Of 20 American species, 11 are described as to group characters and keyed in their groups. The remaining 9 species are so similar to some of the others as scarcely to be distinguished by non-technical descriptions.

Classification: Lizards of the genus Gerrhonotus

Fitch, Henry S. A systematic account of the alligator lizards (Gerrhonotus) in the western United States and Lower California, American Midland Naturalist (University of Notre Dame, Notre Dame, Ind., $1.00 a copy), 20(2), Sept. 1938, pp. 381-424, 5 maps, 6 tables.

History and characters of the genus; characters used in distinguishing species and subspecies; accounts of the forms, each including synonymy, citation of type, diagnosis, range, description, comparisons, variation, and systematic remarks. Five species are recognized, two of them having 4 subspecies each. Two pages of bibliography.

Conservation: Entomology in relation to

Bishopp, F. C. Entomology in relation to conservation, Journ. Economic Entomology (E. N. Cory, College Park, Md., 75 cents a copy), 31(1), Feb. 1938, pp. 1-11.

While this address does not contain much directly relating to wildlife, several of its sections include discussion of interest to wildlife managers. Examples are those concerning insects and health (rats are mentioned), clean-culture farming (strip-planting), water conservation (malarial control), control of mosquitoes (drainage operations), and field crop insects (burning). Besides these there is a section entitled "Entomology and wildlife conservation." In it suggestions are made about insects and ticks that carry animal diseases, fire-ants as enemies of quail, Protocalliphora parasitic on birds, insects injurious to food and cover for wildlife, insects as food for birds, and plants encouraged for wildlife that breed injurious insects.

Conservation: History

Brimley, H. H. A sketch of the history of wildlife conservation in North Carolina, North Carolina Wildlife Conservation (Division of Game and Inland Fisheries, Raleigh, N. C.), 2(7), July 1938, pp. 3-6; 2(8), Aug. 1938, pp. 3-7, 13; 2(9), Sept. 1938, pp. 3-7.

References to early regulations to protect game in Old and New England; notes on the decline of American wildlife under exploitation subject only to State control; North Carolina experience with protection beginning with a deer law in 1745; subsequent laws and the unfavorable reaction of the people to them. Administration of conservation laws by the State Audubon Society; trials and accomplishments. Educational efforts were required from 1910 to 1927 to secure passage of a State-wide code of game laws; achievements under that legislation. The article ends on an optimistic note, but stresses the need of all around cooperation to insure conservation.

Conservation: In national parks

Presnall, C. C. The wildlife program of the National Park Service, Virginia Wildlife (Blacksburg, Va.), 1(12), Aug. 1938, pp. 2-3, 8.

The author aptly compares the use program of the Forest Service and the strict conservation objectives of the Park Service with the dual activities of the farmer who although he uses his farm to obtain the wherewithal for feeding, clothing, and sheltering himself and family, nevertheless finds room for a flower garden or a shaded lawn where all may relax and enjoy themselves. The National Park Service protects wildlife for its faunal, educational, and esthetic values. Predators of alien type are controlled regularly, but those indigenous to the fauna, only exceptionally, when necessity demands. National parks like other refuges serve as reservoirs from which wildlife may overflow, they bring added income to the region, and improve community spirit--the pride of possessing a famous scenic attraction. The Park Service's past and proposed work in Virginia is discussed.

Conservation: Natural areas

Lehmann, V. W. Some values of natural areas, Bird-Lore (1006 Fifth Ave., New York, N. Y., 30 cents a copy), 40(5), Sept.-Oct. 1938, pp. 310-314, 3 photos.

As outdoor laboratories (10 lines of research suggested) and as sanctuaries for threatened forms of wildlife.

Conservation: Of public interest

Deck, Raymond S. Salute to wild life, Country Life and the Sportsman (Philadelphia, Pa., 50 cents a copy), March 1938, pp. 79, 123-126, 2 photos.

An article commenting on the attitude and record of the sportsmen and the "sentimentalists," with suggestions to each group. The essence of it is that wildlife belongs to the people as a whole, and should be conserved in the general interest by public action.

Conservation: Wildlife

Cline, Justus H. Virginia's wildlife resources, Virginia Wildlife (Blacksburg, Va.), 1(12), Aug. 1938, pp. 6-7.

An excellent essay. "We hear little or nothing of our wildlife resources in our marts of trade; neither do we hear anything about sunshine or the air we breathe. The value of the fundamentals of life can not be measured. x x x So many pounds of venison, so many brace of quail, so many dozen frog's legs may be valued commercially. At this stage, however, they have ceased to be wildlife, and their use as a natural resource has reached its final and lowest ebb. Ham and eggs and fried chicken are very satisfactory substitutes for any of these things, but there is no substitute for the organic background of which our wildlife, in a broad sense, is an essential part. x x x Our wildlife resources, just as our agricultural resources, are dependent on our methods of land management. When we approach the ideal of land utilization our wildlife problems will automatically be solved, except for the harvest. And that, of course, must never exceed or even quite equal production."

Conservation: Wildlife of Maine

Aldous, C. M., and A. D. Nutting. Wildlife in Maine, University of Maine (Orono) Extension Service Bul. 248, 15 pp., 5 photos, June 1938.

Early abundance of wildlife; causes of its decline as overhunting, pollution, flooding by power dams, forest fires, predation, and disease; discussion of each of these factors. Value of wildlife in money (with tables of game values in 1936, and fur values 1928-35); notes on food habit, recreational, and esthetic values. What the farmers and sportsmen can do to aid wildlife. Objectives of the cooperative wildlife research unit.

Control: Bears, by electric fence

Storer, Tracy I., George H. Vansell, and Ben D. Moses. Protection of mountain apiaries from bears by use of electric fence, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 172-178, 1 fig.

Authors' abstract: "Beekeepers in the lowlands of California have only a limited season because of dearth of nectar flow and damage to bees by toxic dusts applied to plants and by poisoning from California buckeye. Nectar flows in the Sierra Nevada are available in summer but migrant apiarists have experienced losses due to black bears. For electrified fences, 4 or 5 strands of barbed wire at 6, 16, 28, and 40 inches above ground are supported on porcelain insulators. An 18-inch strip of poultry netting on the soil just outside provides a 'ground.' The fence and netting are energized by a unit consisting of a 6-volt dry battery and 'interrupter' or 'controller' giving 30 to 50 short high-voltage impulses per minute, with maximum current of .015 ampere. Apiaries surrounded by such fences were not molested by bears."

Control: Crows and ravens

Anon. Control of crows and ravens, Texas Game, Fish, and Oyster Commission (Austin, Texas) Bul. 11, 3 pp., 1 fig., Feb. 1938.

Illustration and description of a cage trap and notes on roost bombs and their use.

Cycles: Ruffed grouse

Baumgartner, F. M. Grouse cycles still a wildlife mystery, Michigan Conservation (Dept. of Conservation, State Office Bldg., Lansing, Mich.), 8(1), Sept. 1938, pp. 6-7, 11, 3 photos.

Report on a Michigan study which began in 1929. The peak of the cycle apparently was in 1930 and 1931 in the western Upper Peninsula and a year later in the remainder of the State. In general there was a big drop in 1932 but by 1937 considerable local improvement was noted. "Each small unit of grouse cover appears to have a cycle of its own." The losses that cause the fluctuations occur among the young between hatching time and fall. Numerous suggestions as to the cause of cycles are considered and rejected; a tentative explanation based on the Michigan work is fluctuation in the population of ticks, parasites, which when abundant are fully capable of killing the young. Remedies discussed are environmental improvement and hunting to a sufficient extent to prevent overpopulations.

Destruction: Grizzly bear in California

Grinnell, Joseph. California's grizzly bears, Sierra Club Bulletin (1050 Mills Tower, 220 Bush St., San Francisco, Calif., 75 cents a copy), April 1938, pp. 70-81.

Distinctions between the black and grizzly bears and the essential separateness of their ranges. [Both now live fairly close together in Yellowstone Park.] Maximum weight (about 1200 pounds) and disparity of the sexes in size. Food habits; numbers (possibly there was one grizzly to each 20 square miles of suitable territory or about 3,000 for the State at any one time prior to 1830). Having from 1 to 3 cubs, the reproductive potential was high for so large an animal, hence there must have been effective checks as to which four suggestions are made: destruction of younger males by those in their prime, limitations of food supply and territory, and decrepitude. Notes on life history. The last grizzly known from the State was killed in 1922. Reasons for killing these bears, both in pioneer and later times. Market hunting to provide "jerky" and poisoning by sheep herders hastened extirpation.

Destruction: Prairie chicken

Viehmeyer, Glenn. Is the prairie chicken passing?, Nebraska Bird Review (1410 North 37th St., Lincoln, Nebr., 50 cents a copy), 6(2), July-December 1938, pp. 25-28.

The author believes "that the species has been reduced to the absolute minimum for survival." Early destruction by market hunting was an important factor; homesteading of the plains by people who had to live off the country continued the process of destruction; and overgrazing is apparently completing it. Disease, and the crow, duck hawk, and other predators tend to prevent recovery. The only hope for saving the species in Nebraska is Federal refuges so managed that they will afford safe, all-year homes for the birds.

Diseases and Parasites

Whitlock, S. C., and Carl Gower. Looks are often deceiving in parasites, too, Michigan Conservation (Dept. of Conservation, State Office Bldg., Lansing, Mich.), 8(1), Sept. 1938, pp. 8-9, 6 photos.

Brief accounts of papilloma in cottontails, Sarcocystis in ducks, Ascaridea lineata in ruffed grouse, tularemia in rabbits, mange in squirrels, and ticks on a variety of creatures.

Diseases and Parasites: Anoplura on marmots

Olsen, O. Wilford. Sucking lice (Anoplura) on marmots, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 24(3), June 1938, p. 281.

References to original descriptions, synonymy, and distribution of two American species.

Diseases and Parasites: Blood parasites of birds

Coatney, G. Robert. Some blood parasites from birds of the Lake Okaboji region, American Midland Naturalist (University of Notre Dame, Notre Dame, Ind., $1.00 a copy), 20(2), September 1938, pp. 336-340, 1 pl., 1 table.

Of 63 birds examined in 1935 and 1936, 7 yielded blood protozoans. Records are given for Trypanosoma avium (also a table of measurements), Plasmodium, Haemoproteus, and Leucocytozoon. A species of this genus, L. iowense from a green heron is described as new.

Diseases and Parasites: Coccidiosis in muskrats

Shillinger, J. E. Coccidiosis in muskrats influenced by water levels, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 233-234.

Author's abstract: "Fluctuations of water levels have a pronounced bearing on the physical well-being and health of muskrats. The most conspicuous disease favored by reduced water levels is coccidiosis. Because of droppings being deposited in mud instead of circulating water, soiling the feet and fur of the animals, as well as their food in the muddy runways, massive infestations of coccidia result."

Diseases and Parasites: Corynebacterium

Hammersland, Hazel, and E. M. Jones child. Pseudotuberculosis of deer, Journ. Amer. Veterinary Assoc. (221 N. La Salle St., Chicago, Ill., 40 cents a copy), N.S. 45(2), Aug. 1937, pp. 186-192, 1 fig.

A few Montana deer autopsied showed evidences of pseudotuberculosis due to Corynebacterium ovis. Identification of the organism by inoculation of laboratory animals, its appearance and that of the lesions it causes are described. Another case from the same State is reported in the May 1938 (45(5)) issue, under the title "Pseudotuberculosis in a deer," by W. J. Butler, p. 700, 1 fig.

Diseases and Parasites: Of ducks

Gower, W. Carl. Seasonal abundance of some parasites of wild ducks, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 223-232, 5 figs., 2 tables.

Author's abstract: "Percentage of infection and seasonal fluctuations in infection is discussed for 11 genera of parasitic helminths obtained from the examinations of 104 ducks over a period of one year. 80.5% of the ducks examined were infected with one or more genera of helminths. Individual genera of parasites were involved in from 4.8% to 57% degrees of infection. The seasonal fluctuation varied from 0% in some cases to as high as 65% in others. Of the 11 genera of worms discussed, 7 are trematodes, 2 are cestodes, and one each a nematode and an acanthocephalan." Michigan. Bibliography of 15 titles.

Diseases and Parasites: Eelgrass

Tutin, T. G. The autecology of Zostera marina in relation to its wasting disease, New Phytologist (Cambridge University Press, 200 Euston Road, London, N.W. 1, England, 7 shillings six pence a copy), 37(1), Feb. 1938, pp. 50-71, 2 pls., 2 figs., 2 tables.

The disease is discussed on pp. 65-69, including review of literature relating to its occurrence on both sides of the Atlantic. "The evidence for the disease being due to a bacterium, a fungus, a Labyrinthula or the discharge of waste oil from shipping is summarized. It is suggested that the enfeeblement of the plant due to lack of sunshine in 1931-2 is the fundamental cause of the epidemic, and that recovery depends on the regeneration of the plant from seed and is therefore likely to proceed slowly." [Comment: While possibly justified by conditions over the eastern Atlantic, the author's hypothesis is not well taken so far as the western side is concerned. The outbreak of disease here came to notice after a series of unusually hot and dry years. So apparent was this that the first investigations of the decline were guided by the thought that it might be connected with the drought.]

Diseases and Parasites: Isospora

Boughton, Donald C. Avian hosts of the genus Isospora (Coccidiida), Ohio Journ. Sci. (Ohio State University, Columbus, Ohio, 50 cents a copy), 38(3), May 1938, pp. 149-163.

Synonymical list of the described species of Isospora. Check-list of 176 species and subspecies of birds, representing 130 genera, 40 families, and 9 orders, that are known to be capable of harboring Isospora. Suggestions as to descriptions of new forms in this group. Bibliography of 29 titles.

Diseases and Parasites: Minnesota investigations

Green, R. G., et al. Minnesota Wildlife Disease Investigations (Dept. of Bacteriology, University of Minnesota, Minneapolis), March 1938, pp. 16-23, tables 8-12; April 1938, pp. 24-32, tables 13-14; May 1938, pp. 33-41, tables 15-16; June 1938, pp. 42-51, tables 17-21; mimeographed.

March issue. Pulmonic tularemia in snowshoe hares associated with lungworm infestation; animals chronically affected by this form of the disease may serve as a reservoir of infection in nature. Simultaneous presence of shock disease and tularemia results in more prevalent and marked lesions of the latter disease. Tabulations record the details of autopsies establishing these findings and the lesions are described. There are notes on the current phase of the snowshoe hare cycle and also the concluding part of a report on feeding "brush" to hares.

April issue. During six years attention has been paid to the possible role of fleas (Spilopsyllus cuniculi) in the natural transmission of tularemia in snowshoe hares and cottontail rabbits. Notes are given on the frequency of occurrence and abundance of fleas on these hosts. Pasteurella tularensis "has been isolated from three naturally infected cottontail rabbits and one snowshoe hare. In no instance have infective fleas been obtained from a noninfected host although infective ticks are commonly found on normal hares. This is presumptive evidence that in the few cases in which tularemia has been isolated from fleas, the infection was transmitted from the host to the parasite rather than from the parasite to the host. No experiments have been done on the longevity of P. tularensis in fleas. Fleas are not believed to be responsible for infections of tularemia in wild snowshoe hares in the northern states in winter."

There is an account of the autopsy of an otter, the death of which may have been due to "an organism of the colon-typhoid group, probably a species of Salmonella." The usual reports on trapping and banding hares are included, accompanied by brief post-mortems of 3 of the animals. The method of censusing and estimating the population of snowshoe hares is discussed, and the results since 1932 presented in a table; the trend has continued downward since 1933.

May issue. Contains a special article by R. G. Green on "Chastek paralysis in nursing fox pups." On two Minnesota ranches 33 and 35 percent of the fox puppies died before the disease could be checked. Tables list the components of the rations in use immediately before the outbreaks. The malady appears to be due to a deficiency in the Vitamin B complex brought on by inclu-

sion of too high a proportion of fresh fish (and possibly fish products) in the diet. It is checked by giving an adequate supply of crude Vitamin B by the use of such foods as milk, liver, and yeast.

Tests by injecting wood ticks (Dermacentor variabilis) into guinea pigs revealed no Pasteurella tularensis in 111 specimens. Tests were made with injections of phlorhizin, a glucoside from the bark and roots of fruit trees, into domestic rabbits to learn about the symptoms produced in comparison with those of shock disease. Blood analysis is given of one of the specimens used in this experiment and also of a snowshoe hare regarded as "normal." Notes on autopsies of 3 other hares and a porcupine are included. The parasites, both internal and external, of 4 hares trapped in population sampling are listed.

June issue. Studies of the sex ratio in several thousand snowshoe hares show it to be approximately 1:1 and not significantly affected by the cycle or by seasonal influences. Pathological reports on miscellaneous specimens relate to a porcupine, a red-headed woodpecker, a ruddy duck, and 4 snowshoe hares. The cause of death of 2 captive chukar partridges was determined as blackhead. The average tick infestation of 4 snowshoe hares was 886.

Diseases and Parasites: Trematode of deer mouse

Reynolds, Bruce D. Brachylaemus peromysci n. sp. (Trematoda) from the deer mouse, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 24(3), June 1938, pp. 245-248, 1 fig.

Virginia. Description, measurements, illustration, discussion of congeners, bibliography of 6 titles.

Diseases and Parasites: Trematode of grebe

Olsen, O. Wilford. A new species of trematode, Diasia podilymbae (Opisthorchiidae), from the pied-billed grebe, Podilymbus podiceps (Linn.), Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 24(3), June 1938, pp. 215-218, 1 pl.

Amendment of the generic description to cover this new species from Minnesota. Brief discussion, 3 bibliographic references, figures.

Diseases and Parasites: Trematode from mink

Ameel, Donald J. The morphology and life cycle of Euryhelinis monorchis n. sp. (Trematoda) from the mink, Journ. Parasitology (Lime and Green Sts., Lancaster, Pa.), 24(3), June 1938, pp. 219-224, 1 pl.

Emendation of the generic definition to embrace the new species described from Ohio and Michigan. Notes on life history and intermediate hosts (snails, frogs). Bibliography of 5 titles.

Diseases and Parasites: Tularemia

Given, E. W. Tularemia and the sportsman, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, Pa., 10 cents a copy), 9(7), Oct. 1938, pp. 8-9, 30, 4 photos.

Tularemia may be contracted from diseased small mammals and from flies, ticks, and fleas. It is not transmissible from man to man. Description of lesions and symptoms of the disease and suggestions for avoiding infection.

Diseases and Parasites: Of whistling swan

Chaddock, T. T. Laboratory report on whistler swan, Wisconsin Conservation Bul. (State Conservation Dept., Madison, Wis.), 3(9), Sept. 1938, pp. 25-27.

Report on autopsies of 8 carcasses of wild birds. Three had been shot, 2 of them fatally. "Five were very aged." Lice were found on 5 of the birds, gizzard worms (Spirotera hamulosa) in 6, Ascaridia lineata in 5, a nematode in the heart of 1, Aspergillus fumigatus in 4, and pneumonia in "most" of them. Other morbid conditions included dropsy, silicosis, emaciation, and perforation of the proventriculus. There are notes on food, naming 5 plants.

Ecology: Census, deer, Inyo Forest

Neilson, Reed S. Deer census report 1938, Inyo National Forest, Region 5, U. S. Forest Service (San Francisco, Calif.) Leaflet, 42-W-2, 14 pp., 4 tables, mimeographed, Aug. 1938.

The census was taken on concentration areas and estimates were made for intervening more thinly populated tracts. Observers traveling downhill on opposite sides of a ridge found the deer by still-hunting methods, and counted them as to totals, and so far as possible by sexes and age classes. On account of differing conditions, the South Half and the North Half of the Forest were censussed separately. Results are presented for these areas both independently and combined. The average concentration for the areas inspected was 77.6 deer per section. The number of deer is increasing. Losses aside from the legal kill are due to poaching, predation, and drowning in the concrete walled upper reaches of a City of Los Angeles aqueduct. Tables give details of the sex and age class findings. The leaflet includes a sample of the report form used in the census.

Ecology: Census, deer, Modoc Forest

Randle, Allan C. Deer winter range studies 1937-1938, Modoc National Forest. California Region, U. S. Forest Service (San Francisco, Calif.) Leaflet 73-W-4, 17 pp., 1 map, mimeographed, Sept. 1938.

Intensive field study revealed definite migration lanes leading from the Fremont Forest in Oregon into the Modoc Forest in California. The extreme length of the migration is about 100 miles. The deer start to move early in fall but the migration is intensified by severe weather. The winter range is

seriously overgrazed and herd regulation by special seasons and controlled hunting on definite areas is recommended. On the census areas, .44 to .51 deer per acre was the population at the height of the season. There are notes on the important food plants.

Ecology: Census, fur animals, Inyo Forest

Nielson, Reed S. Trapping census report 1938. Inyo National Forest, Region 5, U. S. Forest Service (San Francisco, Calif.) Leaflet, 49-W-3, 5 pp., 1 table, mimeographed, Aug. 1938.

The census employed both personal interviews and questionnaires, but for various reasons is regarded as partial, representing about 50 percent of the trappers and 75 percent of the catch. Coyotes and bobcats were the species most sought. The take of each of 24 trappers is tabulated to show the number of each of 7 species caught and the total value of the pelts. For the 24 trappers, the return was $5,552; and for the whole number on the Forest is estimated at $6,884. There is discussion of average prices and the probable fur animal population of the Forest, and suggestions as to a permit system for trappers.

Ecology: Census methods

[Bray, Robert S.] Wildlife census methods applicable to national parks and monuments, National Park Service (Dept. of the Interior, Washington, D. C.), 20 pp., mimeographed, Sept. 1938.

A review of census methods with bibliographies containing 106 titles. Some of the techniques used are briefly stated under the headings: rookeries, waterfowl, terns, gallinaceous and other upland game birds, large mammals, and small mammals. A valuable guide to the subject.

Ecology: Census methods, bobwhite

Bennett, Logan J., and George O. Hendrickson. Censusing quail in early fall, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 169-171.

Use of bird dogs in early morning when heavy dew bound the pollen that kept the dogs from finding birds at other hours. Locating quail in 80 percent of the covey ranges examined was considered sufficient warrant for opening the season. The method is held to be practicable for obtaining information as to the quail population a short time before decision must be made as to opening or closing the season. Iowa.

Ecology: Drainage operations

Authors. Proceedings of the 25th Annual Meeting of the New Jersey Mosquito Extermination Association (Agricultural Experiment Station, New Brunswick, N. J.), 1938, 235 pp., illus.

Thirteen papers in this volume refer in some degree to the relation of mosquito control to wildlife; they are herewith briefly abstracted.

Mrs. Arthur S. Chenoweth of the New Jersey Federation of Women's Clubs, refers to the claim of the New Jersey Audubon Society that one of the major threats to the State's wildlife "is wholesale drainage of marshes for so-called 'mosquito control'," as cheap propaganda. (p. 48.)

R. C. Botsford of the Connecticut Agricultural Experiment Station says, "The water levels required to sustain certain desirable wildlife on the salt marshes must be limited by requirements necessary for hay production or mosquito control, or both." (p. 107.) "Many of the property-owners and shore-dwellers in Connecticut, who are sympathetic with the conservation of economic forms of wildlife, seem to be firm in their demands that mosquito control shall have first consideration." (pp. 107-8.)

George R. Stratton of the Massachusetts State Reclamation Board records the development in the Duxbury marshes of small areas suitable for wading birds and quotes an agent of the Division of Fisheries and Game to the effect that, "Our experiments have proven to us that mosquito-control work on our tide marshes can be carried on successfully without causing injury to this type of migratory-bird habitat if drastic drainage is avoided. This is the preventive which should be followed when first practicing mosquito control, thereby eliminating the necessity and expense of applying remedial measures." (p. 111.) This is from a report by Harold M. Bradbury that was published in The Journal of Wildlife Management, 2(2), April 1938, pp. 49-52 (noticed in WILDLIFE REVIEW, No. 14, May 1938, p. 9).

Milton H. Price, Supervisor of Post Mosquito Control for Rhode Island, describes changes in ditching methods to benefit wildlife. He says, "Although this work is not a year old, we believe that the control of mosquito breeding will be accomplished. We know that we have improved conditions for migratory waterfowl." (p. 112.) The new system is characterized by broad shallow ditches connecting all ponds and potholes, providing for circulation of water at every tide. "The area is well covered with widgeon grass. It is a natural feeding ground for our wild ducks, and the conditions are ideal for migratory birds." (p. 113.) Discussion of this paper brought out varying points of view as to wildlife relationships.

Byron H. Mitchell of the Suffolk County [Long Island] Mosquito Extermination Commission devotes his entire paper (pp. 121-124) to discussing the opposition of wildlife interests to mosquito control. He defines their objectives as they appear to him and questions their conservation trend as they seem directed toward providing birds to kill for sport. He thinks control of hunting abuses would save more birds than all the propaganda against mosquito control.

Robert L. Mentzer of the Delaware County [Pennsylvania] Mosquito Extermination Commission reports on ditching of a freshwater tide marsh, operations which were inspected by the Biological Survey and pronounced not adverse to the flora and fauna (except mosquito larvae). (p. 126.)

W.S. Corkran of the Delaware Mosquito Control Commission refers to unfair propaganda and unprofessional statements of wildlife proponents, and maintains that ducks and muskrats have increased in ditched marshes. He claims that "with proper cooperation, mosquito breeding can be controlled and wildlife conditions can be improved simultaneously." (p. 136.)

J. Lyell Clarke of the Des Plaines [Illinois] Valley Mosquito Abatement District thinks that intermittent fresh water marshes can be made wildlife oases by digging deep pools in which aquatic organisms will concentrate and natural enemies then control the mosquitoes. (pp. 143-4.) [This and other proposals of the author ignore the fact that natural enemies unaided are rarely able to control anything to the degree desired by man. In discussion of the paper, C. R. Twinn of Toronto, Canada, made this point. See also comment by Thos. J. Headlee, p. 216.]

L. L. Williams of the U. S. Public Health Service stated that malaria hazards "have been added to by recreational, soil conservation, flood control, and wildlife conservation interests." (p. 151.)

F. C. Bishopp and J. L. Webb of the U. S. Bureau of Entomology and Plant Quarantine, in a review of mosquito work throughout the world, refer to the wildlife relationship. They conclude that, "Those directing mosquito control have in the main shown a good cooperative attitude and a desire to save or improve wildlife habitats where such action will not involve too great an expense or a sacrifice of the main objectives of the work, namely, the control of mosquitoes." (p. 155.)

H. H. Stage of the U. S. Bureau of Entomology and Plant Quarantine, reporting on mosquito control in the Pacific Northwest, states that due to the habits of the insects there, control measures may be such as will readily be approved by wildlife advocates. The brush clearing on floodplains has already been pronounced by specialists from Oregon State College as "beneficial to wildlife generally." (p. 191.)

F. C. Daiber, Donald McCreary, and L. A. Stearns of the Delaware Agricultural Experiment Station, giving results of an investigation of "Factors affecting the vegetative cover of Delaware Marshes" (pp. 209-215), consider salinity, pH values, and soil temperatures of minor importance due to ranges in tolerance of the plants. The height of the water table seems to be controlling and it is a factor greatly affected by ditching.

Clarence Cottam of the U. S. Biological Survey has an article entirely devoted to "The coordination of mosquito control with wildlife conservation" (pp. 217-223). It points out the special interest of the Biological Survey in wildlife, and the qualifications of its representatives for judging the effects of mosquito control operations. Some of these are detrimental to wildlife, an important national resource that must be maintained. It is held that there are satisfactory means of mosquito control other than simple ditching and that being less injurious to wildlife they should be adopted. Biological control seems promising and should be further studied and tested. Instances of the coordination of mosquito control and wildlife conservation are cited, and suggestions

made of desirable practices in that direction. Excessive burning of marshes is condemned. "Mosquito-control workers and wildlife conservationists in the future should more closely coordinate their activities, so as to accomplish the purpose of each without jeopardizing the interests of either."

Ecology: Drainage in relation to wildlife

Kenney, F. R., and W. L. McAtee. The problem: Drained areas and wildlife habitats, U. S. Dept. Agriculture Yearbook 1938 (Supt. of Documents, Washington, D. C., $1.75 a copy, bound), pp. 77-83, 2 figs.

Extent of drainage operations; taxes delinquent on 30 percent of the drained area; part of the land never occupied; much drainage has, therefore, been uneconomic. Ill-advised drainage has injured not only man but wildlife. Some of the drained areas could have profitably been left in their original condition for the returns from wildlife production. Ill effects of drainage on the fauna. Steps now being taken to restore drained areas and to preserve still unspoiled environment. Refuge program of the Biological Survey. This paper is synthetic, the authors being unknown to each other, and the article being altered and put together by an editor. The first seven paragraphs and the last one apparently were taken from a manuscript supplied by author No. 1, and the remainder of the article (about three-fourths) from copy prepared by author No. 2.

Ecology: Fire as an agent in

Lloyd, Hayes. Forest fires and wildlife, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 36(10), Oct. 1938, pp. 1051-1054.

Fires improve conditions for some kinds of wildlife but spoil them for others. The most marked adverse effects are not those of direct destruction but those resulting from far-reaching changes in ecology following extensive severe burning. Instances cited are the practical elimination of caribou from northern Ontario and interior Labrador. Successive fires after logging "may produce what is, in comparison with other areas, a biological desert." Human needs may require control of fire that would otherwise be "a mere incident in the natural history" of an area.

This issue of the Journal of Forestry like that for March 1935 contains a number of papers on fire in relation to forests.

Ecology: Limiting factors in pheasants

Swanson, Gustav. When and why are pheasants abundant, Minnesota Conservationist (State Dept. of Conservation, St. Paul, Minn., 15 cents a copy), 59, July 1938, pp. 20-21, 24-30, 4 photos.

Chiefly a summary of the results of several authorities in regional States with some original comment and suggestions. Fecundity, grit utilization, nesting losses, and natural enemies are given most attention. Bibliography of 7 titles.

Ecology: Openings

Anon. The national parks, Virginia Wildlife (Blacksburg, Va.), 1(12), Aug. 1938, pp. 4, 7.

The need of maintaining openings for the good of wildlife. Evidence cited in a letter by Professor John W. Wayland that there were extensive open areas in Virginia when the white men first came.

Education

Anon. [The field of conservation education], American Nature Assoc. Quarterly Bul. (1214 Sixteenth St., N. W., Washington, D. C., 25 cents a copy), 1(3), Oct. 1938, 30 pp., illus.

The conservation education problem in schools. Contributions to educational resources and activities by commercial concerns, magazines, clubs, youth organizations, biological field stations, and federal and state agencies. A map shows the location of biological field stations. There is a list with addresses of 35 private organizations interested in conservation education.

Education: Birds of Pennsylvania

Luttringer, Leo A., Jr. Pennsylvania Birdlife, Pennsylvania Game Commission Bul. 17 (Harrisburg, Pa., 10 cents a copy), 66 pp., illus., 1938.

Intended to inform Pennsylvania citizens about common small birds, their appearance, habits, value, and means of attracting and protecting them. Chapter headings: Value of birds, Interesting things about birds, Some common birds, A list of Pennsylvania birds, How to study birds, and Bird protection. Cover in color by George M. Sutton portrays the cardinal, and frontispiece in color by R. Bruce Horsfall, 12 species of common birds.

Education: Conservation literature

Gordon, Eva, et al. The elementary science library, Cornell Rural School Leaflet (New York State College of Agriculture, Ithaca, N. Y.), 32(1), Sept. 1938, 75 pp., illus.

Contains references to, and brief abstracts of, many nature-study books, including those of general scope and others relating to animal life, mammals, birds, fishes, amphibians, reptiles, plants, etc. The works cited are not all elementary but include as well those of the standard of the Nature Library and the Field Book series.

Education: Extension

Hill, R. G. Wildlife extension activities in Michigan, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 235-238.

Author's abstract: "Enjoyment of wildlife by an increasing number of people has resulted in demand for information on wildlife production and management. Considerable wildlife is destroyed each year by individuals unfamiliar with year round needs of the animals. Landowners in good game areas are unwilling to aid wildlife due to trespass of hunters who fail to secure permission to hunt. The need for educational work is apparent. Extension activities are being carried on with sportsmen, farmers, and youths. With the present economic status of game, farmers cannot be expected to alter their land programs to any appreciable degree in favor of wildlife. Educational efforts with landowners must be centered around efficient land use and good agricultural practices secondarily beneficial to wildlife."

Food Habits: Bald eagle

Munro, J. A. The northern bald eagle in British Columbia, Wilson Bulletin (Sioux City, Iowa, 50 cents a copy), 50(1), March 1938, pp. 28-35, figs. 9-12 (photos).

Field observations on Graham Island. The eagles were seen to eat stranded dogfishes, and a deer carcass washed in by the tide, but not to attack wild fowl, pheasants, rabbits, or lambs. Notes from other observers and other localities included show predation on American mergansers and coots; notes on food debris at nests also are given.

Food Habits: Beaver

Aldous, Shaler E. Beaver food utilization studies, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 215-222, 1 pl., 4 figs., 1 table.

Stripping twigs and bark from aspens and weighing them gave data for curves from which can be read the weight of beaver food available in trees from 1 to 9 inches in diameter, or in the tops alone when the upper cut is from 3 to 6 inches. Similar curves are given also for alders 4 inches or less in diameter.

Author's conclusions: "(1) Aspen is the most important of the food species of beavers in the Superior National Forest, with birch, alder, and willow next in rank. (2) The degree of utilization of aspens based on measurements of 456 trees was 36% and of waste 64%. (3) The greatest complete wastage occurs in trees between 4 and 6 inches in diameter because there is usually a heavier stand of these sizes and more of the cut trees lodge, thus preventing utilization. (4) Feeding experiences show that beavers consume between 22 and 33 ounces of aspen bark and twigs daily." Minnesota.

Food Habits: Deer dietary requirements

Nichol, A. A. Experimental feeding of deer, University of Arizona (Tucson, Ariz.), Tech. Bul. 75, 39 pp., 13 pls., 3 figs., 4 tables, June 1938 [Sept.].

This is the final report on an investigation that was referred to in WILDLIFE REVIEW, No. 6, November 1936, p. 15. The study--a much-needed one of both mule deer and white-tailed deer--yielded information that should be of great value in connection with the management of these species in the Southwest. The corrals and their equipment, and the methods used in the experiments (carried on for 3-1/2 years) are described. Among results it was found that a general sustenance ration required 2.2 pounds of food per hundred-weight of animal, and that an adequate pregnancy ration required increase only to 2.35 pounds. These figures were found to be the same for both native forages and domestic feeds. Taking into consideration individual and seasonal variations in diet and application to range conditions, the author states that "the daily forage removal of air-dry feed in pounds from a given range by deer of all classes will equal their hundredweight multiplied by the figure 2.35."

The seasonal availability of 168 plants and their palatability ratings as determined by experiment are tabulated. Among trees, aspen was clearly the most palatable; of shrubs, Eriogonum wrightii was most important, although outranked in palatability by mistletoes; of the grasses, Paspalum distichum and Triodia mutica led, and among other herbs, Amaranthus palmeri, Chenopodium fremontii, Galium aparine, Erodium cicutarium, and Artemisia mexicana are high in palatability and important because of their wide distribution. Oaks are of marked value due to the year-long availability of their foliage and the high nutritive quality of their acorns. Deer appear to avoid the poisonous plants that sometimes cause considerable losses of livestock.

Salt requirements are stated as a pound for 10 deer per month in summer and half that amount in winter. Water consumption per hundredweight of animal is 1 to 1-1/2 quarts per day in winter and twice that quantity in summer.

There is a section on parasites and diseases. Of the arthropods, only wood ticks and screw-worm flies are of importance. A bacterial disease possibly due to a Pseudomonas killed 7 of 8 fawns in captivity.

The bulletin includes chapters on breeding and gestation, on the weight of fawns at birth and their growth and behavior, on hybrids, and on glandular activity.

Food Habits: Fish-eating birds

White, H. C. Local feeding of kingfishers and mergansers, Journ. Biol. Board Canada (University of Toronto Press, Toronto, Canada, 10 cents for a separate of this article), 3(4), Sept.-Oct. 1937, pp. 323-338, 2 figs., 1 table.

The feeding habits of the kingfisher were studied from pellets and those of mergansers from stomach contents.

Author's abstract: "On the Margaree and Apple rivers, N. S., the belted kingfisher feeds upon those fishes most available within its feeding range. In the estuaries many species are taken, but ascending a river the number becomes less until only salmon and trout (Salvelinus), or trout alone, constitute the food. By rearing a young bird it was determined that the American merganser

pursues its prey by sight under water, being able to see a distance of from 10 feet (3 m.) to 2 feet (0.6 m.) or less, depending upon the clearness of the water. The bird consumes daily on the average more than a third of its weight. In nature the broods are reared up stream where young salmon are the dominant fish and constitute the major food item, with trout next. When the supply becomes scarce they shift down stream and in the estuary take the various fishes occurring there. In contrast the young red-breasted mergansers were found feeding over areas not frequented by young salmon, and the adults were confined largely to the estuary. They fed on the species available, which sometimes consisted largely of young salmon."

Food Habits: Hawks

Brockenridge, W. J., and Paul L. Errington. Food habits of small falcons in north-central states, The Auk (Rudyerd Boulton, Field Museum, Chicago, Ill., $1.00 a copy), 55(4), Oct. 1938, pp. 668-670.

Pigeon hawk, mostly birds, some insects; sparrow hawk, meadow mice in winter, chiefly insects at other seasons. Specific names of much of the prey given.

Food Habits: Hawks and owls

Langenbach, John R. The food habits of hawks and owls, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, Pa., 10 cents a copy), 9(8), Nov. 1938, pp. 12-13, 1 photo, 1 table.

Tabulation of frequencies and their percentages of the principal food items found in 741 stomachs representing 17 species of hawks and owls submitted for bounty payment. Rabbits were important in the diet of the great horned owl and goshawk, and squirrels, poultry, and game birds in the goshawk and Cooper's hawk. Although bounties were payable on only the great horned owl and goshawk, it is of interest that of the 1,297 hawks and owls received, 349 (26%) were of other species (16 in all).

Food Habits: Muskrat

Errington, Paul L. Observations on muskrat damage to corn and other crops in central Iowa, Journ. Agr. Research (Supt. of Documents, Washington, D. C., 20 cents a copy), 57(6), Sept. 1938, pp. 415-421.

Author's summary: "Data on food habits of muskrats in central Iowa were gathered from the summer of 1934 to the winter of 1937-38. Much the same areas were kept under observation during the entire period of study, and these were representative of intensively cultivated farm land adjacent to muskrat stream habitats of various types. Damage to farm crops through the foraging of muskrats was confined almost exclusively to corn in fields close to watercourses. The heaviest damage to corn recorded during the investigation occurred in three fields adjacent to a half mile of drainage ditch in Story County. The situation here was observed in some detail throughout 1937, and the visible loss in yield because of muskrats was appraised at $7.18 (equivalent of 18.4 bushels at $0.39 as of November 15). The current market value of the muskrat pelts taken by

trappers from corresponding parts of the ditch was $16.20 (27 pelts at $0.60 flat rate). Of 26 cornfields bordering about 11 miles of muskrat-occupied watercourses in 1937, only 1, in addition to the 3 near the drainage ditch, showed clear evidence of damage; the other 22 either were not used at all by muskrats or were used so slightly that the losses were immaterial."

Food Habits: Pellet formation in owls

Chitty, Dennis. A laboratory study of pellet formation in the short-eared owl (Asio flammeus), Proc. Zool. Soc. London (Longmans, Green, and Co. Ltd., London, England, 12 shillings a copy), Ser. A., 108(2), July 1938, pp. 267-287, 1 pl., 4 figs., 10 tables.

Study made at the Zoological Gardens, London, with an owl that had been in captivity about a year. Description and illustration of cage and apparatus for recording pellet expulsion. Account of the experiments and reactions of the owl. Comparative discussion of other species.

From the author's summary: "The owl emptied its stomach completely with each pellet, which consisted of the indigestible residues from one or two meals of which the combined weight seldom exceeded 40 gm. Experiments could not be carried out under properly controlled conditions. However, it appears that the length of time a pellet is retained increases logarithmically with the weight of the meal, but that several factors may influence this relationship. By night pellets are retained longer than by day, and hunger may also increase the interval. When excess food is available the interval is shortened. The biochemical composition of the owl's food is estimated. It is shown that through ejection of the pellet the diet contains a very low percentage of ash, and particularly of calcium. In the absence of quantitative field data estimates are attempted of the food requirements in the wild. It is concluded that in one year a Short-eared Owl would certainly eat more than 47 lb. of voles or mice, and probably more than 95 lb. but less than 142 lb. This represents a consumption of food animals that may roughly be stated as 2000 ± 50 per cent. For a certain area on the Scottish border census figures are available of the Short-eared Owl and vole populations in April 1933. It is shown that the daily requirements in this month would be met by 0.02 to 0.05 per cent. of the vole population. This figure includes a fraction of about 18 per cent. of the dry weight not utilized through its ejection in the pellet. It does not allow for a further possible wastage of animals caught and eaten only partly or not at all. However, it seems unlikely that at the densities under consideration the total predation would act as an appreciable check upon the vole population."

Food Habits: Pine seed destruction by birds

Burleigh, Thomas D. The relation of birds to the establishment of longleaf pine seedlings in southern Mississippi, Southern Forest Expt. Sta. (New Orleans, La.) Occasional Paper 75, 5 pp., 1 pl., 1 table, offset, July 1938.

Author's summary: "(1) Under present conditions, in the locality studied, rodents are not an important factor in the success or failure of longleaf pine reproduction; (2) certain birds, including the southern meadowlark, the mourning

dove, four species of blackbirds (the cowbird, the rusty blackbird, Brewer's blackbird, and the red-winged blackbird), and the bobWhite, are responsible for the disappearance of a large part of the annual seed crop of the longleaf pine; (3) these birds depend to such an extent on this source of food late in fall and early in winter that their movements are largely governed at these seasons by the quantity of longleaf pine seed produced; (4) because of this dependence on longleaf pine seed, obtaining natural reproduction will always be difficult, and unless aided by planting, will require many years; (5) direct seeding should not be undertaken during years when seed is produced in abundance. Maximum natural survival can apparently be obtained when the cone crop is light and birds are relatively scarce. Best results from direct seeding can also be expected during such years."

Food Habits: Sharp-tailed grouse

Swenk, Myron H., and Lyle F. Selko. The late autumn food of the sharp-tailed grouse in western Nebraska, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 184-189, 3 tables.

Authors' abstract: "The food of the sharp-tailed grouse in western Nebraska during the late autumn, following the severe drought of 1934, is discussed. Analyses of the crop and gizzard contents of 29 grouse showed that vegetation made up almost the entire diet, 99.3%; 44.85% consisted of leaves, 37.87% of seeds, and 16.58% of miscellaneous vegetable debris. Common dandelion, common prairie rose, white clover, and sweet clover together constituted 67.69% of the total food. That the common dandelion, an introduced plant, should compose about one-fifth of the entire food, was unexpected. White clover and sweet clover comprised 29.58% of the total food. Animal matter is an insignificant food item in the late autumn, making up but 0.28% of the total food, of which grasshoppers, ladybird beetles, stink-bugs, and other insects accounted for 0.23% of the total food. Grit found in the gizzards of 3 birds constituted 0.42% of the total material found in the crops and gizzards."

Identification: Wisconsin Anatidae

Zimmerman, Fred R. Waterfowl in Wisconsin, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.), 3(10), Oct. 1938, pp. 16-39, 26 figs.

General remarks on the characters, distribution, and importance of the family Anatidae. Brief account of wisconsin species including for each a statement of the local names, principal breeding range, and field marks. Black and white illustrations reinforce the descriptions of field characters and both media particularize sexes when they differ.

Life Histories: Beaver

Carr, William H. Beaver, builder of empire, Natural History (American Museum of Natural History, New York, N. Y., 50 cents a copy), 42(2), Sept. 1938, pp. 100-106, 8 photos.

Observations made in Palisades Interstate Park, N. Y., where the preferred foods are alder, aspen, and poplar. Beaver meadows, the sites of abandoned ponds are fertile and soon prove attractive to wildlife including blackbirds, muskrats, skunks, raccoons, and deer. Beaver ponds in use modify ecological conditions in favor of wild ducks, and of birds that find nesting-sites in dead trees, and those preferring the humid environment of pond shores; they also promote the increase of fur animals. Standard facts in the life history of the beaver are recorded.

Life Histories: Beaver

Hiner, Laurence E. Observations on the foraging habits of beavers, Journ. Mammalogy (Wm. B. Davis, A. & M. College, College Station, Texas, $1.00 a copy), 19(3), Aug. 1938, pp. 317-319.

In Itasca State Park, Minn., where beavers, after extermination, were reintroduced in 1901 and had reached the stage of overpopulation by 1934. Then apparently the animals were forced to travel maximum distances for food. Observations of other writers in that respect and the authors' findings cited. The average of the distances measured was 267 feet; the maximum 453. The longer hauls were down slopes. Bibliography of 5 titles.

Life Histories: Beaver

Warren, Edward R. The work of beavers, Scientific Monthly (Lancaster, Pa., 50 cents a copy), Aug. 1938, pp. 176-181, 5 figs.

Notes on spillways and repairs to dams, and effects of floods upon beavers.

Life Histories: Birds of prey

Bent, Arthur Cleveland. Life histories of North American birds of prey. Part 2: Orders Falconiformes and Strigiformes, U. S. National Museum Bul. 170 (Supt. of Documents, Washington, D. C., 60 cents a copy), 482 pp., 92 pls., 1938.

This is the 11th volume in the well-known series of life-histories and the 2nd on the birds of prey. From the author's life-long compilation of data are prepared accounts of the species that in most cases include discussion of the habits of the bird by seasons with special emphasis on the nesting period; description of the eggs and young, and of plumages at various ages; statements as to food, behavior, voice, field marks, migration, and distribution. The present installment treats 20 species and subspecies of hawks and 56 of owls. The illustrations are numerous and of good quality.

Life Histories: Buffalo

Garretson, Martin S. The American bison. The story of its extermination as a wild species and its restoration under federal protection (New York Zoological Society, New York, N. Y., $2.50 a copy), xii+254 pp., 58 pls., 7 text-figs., 1938.

Hornaday effectively told the story of "The extermination of the American bison" in 1889 and his work is fully acknowledged by the present author. The latter retells the story in his own way, embellishes it with numerous interesting illustrations, and dwells upon the preservation of buffaloes upon reservations and the history of existing herds. Chapter headings that further indicate the nature of the contents are: First discovery, Distribution, Appearance, Habits, Food, Migrations, Trails, Numbers, Enemies, Diseases, Extermination by regions and periods, Notable bison hunts, Cattlemen and the buffalo, Indians and the buffalo, Museum collecting, Last remnants and new herds. An appendix of annotations includes many bibliographical references, and there is a full index. In giving credit (p. viii) for the building up and care of existing herds, it might have been better to list the agencies in the chronological order of their endeavors. The National Parks' contribution should have been mentioned at this point and perhaps more emphasized in the concluding chapters. The Yellowstone herd was the first (established in 1902) of those (not in zoos) now under the care of the Federal government.

Life Histories: Cottontail, breeding

Allen, Durward L. Breeding of the cottontail rabbit in southern Michigan, American Midland Naturalist (University of Notre Dame, Notre Dame, Ind., $1.00 a copy), 20(2), Sept. 1938, pp. 464-469, 1 pl., 1 table.

Review of the literature of which 10 titles are cited. Studies made from 1935 to 1937 on the W. K. Kellogg Bird Sanctuary are discussed under the topics of breeding season, nesting and care of young, and sex ratio.

Life Histories: Grouse

Cooney, Robert F. Our upland game birds, U. S. Forest Service, Northern Rocky Mountain Region (Missoula, Mont.) Field Notes on Wildlife, 5 pp., mimeographed [Oct. 1938].

Observations in the Lolo Forest, Idaho, on Richardson's and Franklin's grouse and the gray ruffed grouse, with general statements on nests and young, loss from predators, effect of sheep grazing, kill by hunters, and feeding habits.

Life Histories: Sea otter

Bolin, Rolf L. Reappearance of the southern sea otter along the California Coast, Journ. Mammalogy (Wm. B. Davis, A. & M. College, College Station, Texas, $1.00 a copy), 19(3), Aug. 1938, pp. 301-303.

Further reference to the animals reported by D. D. McLean (see WILDLIFE REVIEW, No. 15, July 1938, p. 24). The locality is given exactly and there is the welcome assurance that a warden has been assigned to guard the animals. Notes are given on numbers, size, color, habits, and food.

Life Histories: Striped skunk, den ecology

Selko, Lyle F. Notes on the den ecology of the striped skunk in Iowa, American Midland Naturalist (University of Notre Dame, Notre Dame, Ind., $1.00 a copy), 20(2), Sept. 1938, pp. 455-463, 5 figs., 3 tables.

Notes on the environment of 30 dens studied in 1936 and 1937. Site, number of entrances, exposure, animal making the den, distance from water, predominant vegetation, and degree of grazing are tabulated for the environments of dens classed as pre-hibernating, and spring and summer dens. Family dens had 2 entrances and were largely dug by the skunks. Dens occupied at other than breeding seasons averaged less than 2 openings and were chiefly those dug by other animals, principally woodchucks. The majority of the dens were near rivers and creeks; none more than half a mile away from water. Their relation to wooded areas and croplands also is discussed.

Life Histories: Wild boar in Tennessee

Stegeman, LeRoy C. The European wild boar in the Cherokee National Forest, Tennessee, Journ. Mammalogy (Wm. B. Davis, A. & M. College, College Station, Texas, $1.00 a copy), 19(3), Aug. 1938, pp. 279-290, 1 pl.

Information obtained during 3 months of study, combined with extracts from European literature on the wild boar and its life history. Physical characters, field characteristics, general habits, seasonal behavior, food, wallowing, rubbing, tusking, bedding, breeding, and growth and development of young are discussed, as well as the boar's ecologic relationships to other animals. This European species was introduced in 1912 but has been closely hunted by the natives; only about 230 are believed to be present.

From the author's conclusions: "The wild hog on the forest is the European wild boar, Sus scrofa. There are a good many animals that appear to be full-blooded wild stock. Hybrids possess many of the physical characters of the wild boar, which are dominant over those of the domestic pig. The hybrids appear to be fertile when crossed in various ways. Wild boars are the most game species on the forest. The area is well suited for the species. At the present time there is no severe conflict between the wild boar and the other game species." [Comment. The last conclusion is possible only because of the small numbers of the animals present. Wild boards in abundance would be a menace to both the fauna and flora.]

Life Histories: Willet

Vogt, William. Preliminary notes on the behavior and the ecology of the eastern willet, Proc. Linnaean Soc. N. Y. (American Museum of Natural History, New York, N. Y.), 49(1937), pp. 8-42, 4 figs., Oct. 1938.

This paper relates to notes and their probable significance, defense of female and territory, courtship and copulation, nesting and nest relief, social behavior, ecology, and conservation of the willet. Although a fragmentary study, it was in the modern manner and was partly experimental. The paper includes a bibliography of 32 titles.

Life Histories: Zapus

Sheldon, Carolyn. Vermont jumping mice of the genus Zapus, Journ. Mammalogy (Wm. B. Davis, A. & M. College, College Station, Texas, $1.00 a copy), 19(3), Aug. 1938, pp. 324-332, 2 pls.

A good start on the difficult task of observing and recording the manners of these interesting mice. The discussion covers the home range, abundance and fluctuation, signals, orientation, parasites, food, nests and young, and hibernation. Bibliography of 6 titles.

Management: Bears in national parks

Cahalane, Victor H. Don't feed the bears, Saturday Evening Post (Curtis Publishing Co., Philadelphia, Pa., 5 cents a copy), 211(4), July 23, 1938, pp. 23, 62-63, 65, 3 photos.

Mainly a collection of anecdotes about the doings of bears in national parks and the inter-relations of these animals and the tourists. Statement as to measures that have been taken to minimize danger from the bears and as to the elimination of thoroughly spoiled individuals. The bears should not be alternately petted and repulsed, but should be given a chance to lead a normal life--to remain wild.

Management: Clearing

Abell, C. A. Stripping brushfields for planting in California, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 182-183, 1 pl.

Author's abstract: "Successful planting of trees on California brushfields has required the development of special machinery to clear lanes through dense brush. The Plumas brush stripper, found most satisfactory to date, is a plow-like machine weighing 4 tons pulled by a 90 H.P. tractor. Strips 6 to 7 feet wide were cleared for $7.58 per mile."

Management: Clearing

Howard, M. C. Use of power in making small clearings in bear oak brush for wildlife, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 179-180, 3 pls.

Author's abstract: "Experiments in creating desirable interspersion of herbaceous growth in dense stands of young timber prove that clearing small openings by power is the most economical method. A specially constructed trail-builder blade operates successfully in rocky soils, handling stumps up to 15" in size, the work costing 90% less than hand labor and 80% less than tractor stump pulling and hand grubbing." Virginia.

Management: Clearing

Swanson, Herman E. Land clearing by power methods in the control of white pine blister rust, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, p. 181, 4 pls.

Author's abstract: "A caterpillar tractor equipped with a heavily constructed frame bearing a series of digging teeth is used for clearing ribes and other brush on alluvial bottom lands for the control of white pine blister rust. The brush is pushed into piles and burned and the cleared areas planted to grass. The average cost is $50 per acre." Northwest.

Management: Farmer-sportsman relationship

Biddle, Nicholas. A cooperative farm-game program, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, Pa., 10 cents a copy), 9(5), Aug. 1938, pp. 6-9, 4 photos.

A review of farmer-sportsman relationships and of the plan that has been tried to improve them. The project has been referred to several times previously in WILDLIFE REVIEW (7, December 1936, p. 25; 8, April 1937, pp. 20, 21; 10, October 1937, p. 17; 11, February 1938, p. 24; 13, March 1938, p. 12). There is little new, therefore, in the present account. It is a sensible summary, however, and ends on a conservative note. Colonel Biddle says, "In closing, I should like to make it quite clear that we do not claim our Cooperative Farm-Game Project to be a panacea for all ills affecting the management of farm-game. The plan is an experiment in its infancy, and may prove impractical or perhaps not satisfying to either farmers or sportsmen; or its cost may exceed that which is justified in expending for the results obtained. Its worth and its practicability can only be demonstrated by extended trial."

Management: Farmer-sportsman relationship

Mortensen, Bud. The farmer-united sportsmen controlled hunting area. 2 pp. (8-1/2x12-1/2) mimeographed, no date. (United Sportsmen's Association of Minnesota, 510-516 Dupont Ave. N., Minneapolis, Minn.)

A circular addressed to farmers inviting them to join local clubs of the Association, as honorary members, cooperate in establishing a controlled hunting area, and permit game management on their farms. The sportsmen pledge all labor necessary to plant feed patches with seed furnished by the State Conservation Department; they will care for the patch as needed, harvest it, and give half of the produce to the farmer, the other half to be used for feeding wildlife of the controlled hunting area. The sportsmen will also plant trees and shrubs on waste bits of land, stock game birds, encourage song birds, post the land, and regulate the hunting and other behavior of club members. Only good will and permission to hunt are asked of the farmer. The movement seems a praiseworthy step on the part of sportsmen toward cooperation with farmers.

Management: Forest wildlife

Anon. Forests and wildlife, Virginia Wildlife (Blacksburg, Va.), 1(12), Aug. 1938, pp. 4-5.

Clearing areas and improving them for wildlife on the Big Levels Federal Refuge in the George Washington National Forest has increased the grouse and turkey populations from 3 to 8 fold. Calculations are presented to the effect

that expenditures for wildlife improvements are justified even on the best timber areas and that clearing resulting in wildlife increases can be done at a profit.

Management: Forest wildlife

Evans, R. M. Multiple-use forest management, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 36(10), Oct. 1938, pp. 1028-1034.

Big Levels in the George Washington National Forest, Va., as a demonstration area for the production and management of indigenous wildlife along with other national forest resources. "The objective is not to manage the area for wildlife alone, to build up stocks beyond normal carrying capacities nor to exclude other uses, but rather to demonstrate good wildlife management integrated with the management of other forest resources under a single jurisdiction."

Management: Forest wildlife

Morton, James N., and John B. Sedam. Cutting operations to improve wildlife environment on forest areas, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 206-214, 1 pl., 1 table.

Authors' abstract: "Even-aged and mature forest stands must receive cultural treatments to maintain satisfactory habitat for wildlife. Cutting operations include the release of game food producing trees, shrubs, and vines, slashings in small plots to provide additional food and openings, thinnings to promote undergrowth and stimulate fruiting, and the felling of saleable timber which provides brush piles, and encourages vigorous growth of cover and food producing species. Thinning is one of the most valuable cultural operations because it benefits both wildlife and timber production. Where the material is large enough, for the sake of economy, all cuttings should be associated with timber or wood sales. Felled tree tops should be left scattered over managed areas to protect sprout growth and reproduction. All openings in forest areas should be maintained by removing trees to release shrubs and vines and to insure the open areas so essential to wildlife environment. On treated forest areas the carrying capacity for such game as grouse, snowshoe hares, and deer is considerably increased by the improved food and cover conditions." Pennsylvania.

Management: Harvesting, Pennsylvania kill

Anon. Game-kill tabulation reveals astounding facts, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, Pa., 10 cents a copy), 9(7), Oct. 1938, pp. 8, 29.

By special effort, backed by appropriate penalties for noncompliance, 562,696 reports were received for 606,271 hunting licenses issued. Of the total 82,040 or 15%, probably mostly unsuccessful deer hunters, killed no game at all. The reported kill is tabulated chiefly by specific groups. Rabbits lead with squirrels second, both far ahead of any other kinds of game. The total of all kinds exceeds 5,000,000 head.

Management: Herd reduction, deer

Presnall, C. C. A survey of the deer situation in Zion Canyon, Utah, Utah Academy of Sciences, Arts, and Letters (Vasco M. Tanner, Provo, Utah), Proceedings, 15, 1938, pp. 107-110.

History of the area; under protection by the National Park Service vegetation recovered first, then the deer until in 10 years' time a desirable balance was attained; later the deer increased to twice the carrying capacity of the valley; malnutrition resulted in increased mortality from various causes; steps taken to reduce the herd--a necessity to maintain the beauty of the Park.

Management: Herd regulation

Scott, Walter E. The Wisconsin deer situation as of September, 1938, Wisconsin Conservation Department (Madison, Wis.), 7 pp., 1 table, mimeographed, Sept. 1938. Also printed in Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.), 3(10), Oct. 1938, pp. 40-46, 3 figs., 1 table.

Increase of deer in the State has been steady since the first one-buck law was passed in 1915. The amount of hunting permitted has not regulated the numbers of the animal and damage to crops, gardens, and ornamental plants, and highway accidents involving deer have become more prevalent. Many drives have been conducted in recent years and they show populations of from 18 to 42 deer per section on unreserved lands and from 29 to 57 on refuges. One season's hunting reduces the numbers by from 3 to 5 to the section. The deer population has not yet reached the stage where serious depletion of food supplies is evident but that is a contingency to be guarded against by proper herd regulation.

Management: Miscellaneous

Anon. North Carolina Wildlife Conservation (Division of Game and Inland Fisheries, Raleigh, N. C.), 2(7), July 1938, 14 pp., 2 photos; 2(8), Aug. 1938, 15 pp., 7 photos; 2(9), Sept. 1938, 15 pp., 4 photos; 2(10), Oct. 1938, 15 pp., 8 photos.

The July issue contains notes on control of dogs roving over farms and of hunting dogs invading refuges; on history of conservation (see p. 3); big game refuge system being considered for the State; modern agricultural practices in relation to wildlife; and achievements of Pennsylvania game programs.

The August issue continues the historical article noted; calls attention to a recently adopted special regulation for protection of farm game areas, gives a report of progress on the cooperative farm game program (5 field biologists appointed; 234 agreements signed covering nearly 89,000 acres in 60 counties, under 3 plans: regulated hunting, 5-year sanctuary, and temporary sanctuary; improvements being made, and control of stray cats and dogs), and presents extracts from the State game laws and Federal migratory wild fowl regulations.

In the September issue the paper on the history of wildlife conservation in North Carolina is concluded. An article entitled, "Game needs protection,"

comments on depletion, overshooting as a cause, the need of game laws and sanctuaries, and the desirability of regulated hunting. Among notes there is one about chicken snakes robbing purple martin and bobwhite nests.

The October number is featured by an article in which the workings of the Farm Game Program are reflected by an account of the activities of an individual farm cooperator in planting feed patches, leaving cover, and controlling cats and dogs. Notes include reference to finding 2 young rabbits in a chicken snake, and on hedgerows harboring beneficial insects.

Management: Ohio State hunting preserves

Chapman, Floyd B. Ohio's Little Smokies, Ohio Conservation Bul. (Ohio Division of Conservation, Columbus, Ohio, 5 cents a copy), Oct. 1938, pp. 38-40, 6 photos.

Development of State and National forests and State hunting grounds and wildlife sanctuaries in southeastern Ohio. Game as a source of income on forested lands, which, however, must be kept partially open to harbor much wildlife. Game censuses and controlled hunting part of the management program for the area. Notes on methods used to improve the environment for wildlife, including planting trees, shrubs, and food patches, selective cutting, installing dens for squirrels and raccoons, renovating water holes and licks, building dams, and restocking.

Management: Planting fence rows

Edminster, Frank C. Woody vegetation for fence rows, Soil Conservation (Supt. of Documents, Washington, D. C., 10 cents a copy), 4(4), Oct. 1938, pp. 99-101, 2 figs.

Croplands lacking year round shelter are inferior habitat for wildlife. Extensive unfavorable areas may be broken by planting fence rows with shrubs of value to wildlife. The desirable qualifications of such vegetation are catalogued under 12 headings. Brushy fences across slopes and on contours are useful in erosion control and by saving soil benefit wildlife, which, like any other crop, is a product of the soil. They are useful also in protecting woodlands, swales, swamps, and water areas from livestock grazing. To achieve sustained yield of woody products, woodlots must be protected from grazing. The farm program of wildlife management should be drawn upon a multiple-use basis.

Management: Planting legumes

Pieters, A. J. Legumes in soil conservation practices, U. S. Dept. Agr. Leaflet 163 (Supt. of Documents, Washington, D. C., 5 cents a copy), 8 pp., 3 figs., 1938.

General instructions respecting the commonly planted legumes, with special emphasis on Lespedeza sericea as an agent in controlling erosion and catering to wildlife.

Management: Planting for wildlife and erosion control

Edminster, Frank C. Wildlife management in the work of the Soil Conservation Service in Pennsylvania, Pennsylvania Game News (Pennsylvania Game Commission, 10 cents a copy), 9(8), Nov. 1938, p. 29, 1 photo.

The control of erosion is largely a matter of manipulation and control of vegetation, the dominating factor in wildlife environment. Requirements of wildlife and the bearing on them of erosion control practices. Summary of work in Pennsylvania since the beginning in September 1935. Number of trees and shrubs planted totals more than 13 millions.

Management: Planting for wildlife and erosion control

Rowalt, E. M. Soil defense in the South, U. S. Dept. Agr. Farmers' Bul. 1809 (Supt. of Documents, Washington, D. C., 10 cents a copy), 64 pp., 39 figs., 1938.

A section (p. 33, fig. 26) is devoted to wildlife plantings. "Almost any type of vegetation used to control erosion is of some value to wildlife." Suggestions are given for planting eroded spots with lespedezas and shrubs, and a number of trees useful to wildlife also are listed.

Management: Planting for wildlife and erosion control

Van Dersal, Wm. R. Native woody plants of the United States. Their erosion-control and wildlife values, U. S. Dept. Agr. Misc. Publ. 303 (Supt. of Documents, Washington, D. C., $1.75 a copy bound in buckram), 362 pp., 44 pls., 3 folded maps (2 col.), Oct. 1938.

The body of this work is a list of woody plants arranged in the alphabetic order of their scientific names. Important synonyms are given as well as the most available vernacular names. Scientific names are cross-indexed in the main list and the vernaculars are arranged alphabetically in a terminal register. The accounts of each plant typically include a statement of range by numbers to correspond to Plant Growth Regions as defined by F. L. Mulford, notes on site preferences, growth habits, character and season of fruiting, propagation, and utilization by wildlife. Introductory essays treat the relation of vegetation to soil conservation, qualifications of plants that give them value in erosion control and to wildlife, planting for soil and wildlife conservation, plants of objectionable characteristics, selection of species for planting, development of the plant-growth region map, plant-growth regions, and nitrogen fixing bacteria in relation to planting. There is a bibliography of 649 titles. A comprehensive and useful compilation, conveniently arranged and well illustrated.

Management: Raccoon

Anon. Closed seasons fail to increase 'coons, Michigan Conservation (Dept. of Conservation, State Office Bldg., Lansing, Mich.), 8(1), Sept. 1938, p. 3, 1 photo.

Raccoons are of interest to both hunters and trappers, groups between which there is some conflict of interests. Despite varying adjustments of the open season, the 'coon population apparently remains nearly stationary. The annual take runs from 15 to 20 thousand animals. Desirable features of environment for raccoons are mentioned and their preservation urged. The impracticability of propagating 'coons at a cost of $5 to $10 each for release is pointed out as well as the fact that experience indicates that such releases on even a large scale would have little effect upon the raccoon population as expressed in the catch.

Management: Refuges

Conklin, W. Gard. The Pymatuning State game refuge and museum, Pennsylvania Game Commission (Harrisburg, Pa.) Bul. 19, 40 pp., 2 maps, numerous photographs and drawings, 1938.

A booklet prepared for the dedication of the refuge and museum in October. It describes the area in its original condition, gives the history of the movement for creating the sanctuary, notes improvements that have been made, lists the birds, and presents general remarks on the flora of Pymatuning Swamp.

Management: Refuges in Wisconsin

Scott, Walter E. New small refuges, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.), 3(10), Oct. 1938, pp. 57-59.

List of 29 small pheasant refuges with their locations and acreages. Two, of 2,240 and 300 acres, respectively, were set aside for deer and fur animals and special closed areas in various parts of the State were either originally established or reapproved. All of these are in addition to 140 permanent game refuges totalling more than 450,000 acres. In all nearly a million acres are included in the various classes of protected areas.

Management: Salting

Gallaher, Charles. Some observations on game salting, U. S. Forest Service, Northern Region News (Missoula, Mont.), Oct. 1938, pp. 27-28, mimeographed.

Relates to the same Idaho Forests mentioned in the abstract of George W. Case's paper in WILDLIFE REVIEW, No. 15, July 1938, p. 35. Twenty-three thousand pounds of salt were distributed by airplane at an approximate cost of 3-1/4 cents per pound. Ground inspection in about 3 weeks showed the salt already consumed on elk range and largely used up on areas frequented by deer. Pulverized salt is objectionable in causing metal parts of the airplane to rust; to avoid that and to provide a more lasting supply, the use of block salt is recommended.

Management: Sandhill crane

Hamerstrom, F. N., Jr. Central Wisconsin crane study, Wilson Bulletin (Sioux City, Iowa, 60 cents a copy), 50(3), Sept. 1938, pp. 175-184, figs. 25-26 (maps).

Sandhill cranes on a Farm Security Administration project. Favorable habitat is characterized by shallow ponds 40 acres or larger in area, isolation, openness, and considerable extent--one to five thousand acres. In the region studied these requisites are found only in deep peat basins. Notes on breeding, migration, and food. Recommendations are made for management of the area for cranes. Bibliography of 10 titles.

Management: Soil conservation practices in relation to

Chase, Warren W. Soil and wildlife conservation, Minnesota Conservationist (State Dept. of Conservation, St. Paul, Minn., 15 cents a copy), 60, Aug. 1938, pp. 14-15, 30, 2 photos, 1 table.

Wildlife is a crop and a product of the soil. Soil conservation practices (6 described), therefore, benefit wildlife. In the writer's opinion, with improvement in food and cover conditions in agricultural areas the necessity for winter feeding will be greatly reduced. The table records the increase of ruffed grouse in the Gilmore Creek project, near Winona, Minn., from one bird to 30.7 acres in March 1935 to one to 8.5 acres in October 1937.

Management: Stocking

Anon. More game birds for State, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison, Wis.), 3(10), Oct. 1938, pp. 3-5.

Production and distribution from the State Experimental Game and Fur Farm. Experimental stocking included chukar partridges, wild turkeys, valley quail, and Reeves, Nepal, kaleege, mutant, and Formosan pheasants. Regular operations dealt with ring-necked pheasants and Hungarian partridges. In some counties the number of birds stocked exceeded those shot the preceding season.

Management: White-tailed deer

Gerstell, Richard. The Pennsylvania deer problem in 1938, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, Pa., 10 cents a copy), 9(5), Aug. 1938, pp. 12-13, 31, 3 photos, 1 map; 9(6), Sept. 1938, pp. 10-11, 27, 32, 6 photos; 9(7), Oct. 1938, pp. 6-7, 29, 1 photo, 3 maps.

The problem, while relieved to some extent, is still threatening. It is primarily one of food shortage in winter but which if neglected may become perennial. Growth of woods from the brush to the sapling stage, suppressing undergrowth, together with overbrowsing by an increasing deer herd brought on the difficulty which has been accentuated locally be sedentary behavior of the animals. A rather general state of malnutrition has been reached. It has been accompanied by practical elimination of favored food plants by overbrowsing and by increased resort to less palatable kinds. Stunting has been widely noted and experiments plainly indicate that it is due to deficient diet. Antler development is decidedly retarded. Though yet not definitely proved, it appears that the generally unfavorable food conditions tend to lower the reproductive rate and to result in an excessive proportion of females among the progeny. [Caution is needed here as in most previously reported investigations of other animals a preponderance of male offspring has been associated with poor, and of females

with good, nutrition.] Malnutrition increases winter losses from starvation, parasitization, and pneumonia. The demand for food by an excessive deer herd has interfered with natural forest regeneration and resulted in the destruction of forest plantings. It has caused considerable damage also to orchards and crops.

The true deer range of the State is some 8,300,000 acres, of which 18% is in good, 32% in fair, and 50% in poor condition so far as food supplies are concerned. Until lumbering on an extensive scale is resumed, food will remain inadequate and the deer herd must be regulated. To reduce it to the desirable level of a deer to 25 acres, it would be necessary to get rid of 40% of the present population. Practical considerations indicate that entire elimination in some areas, and a general 25% reduction maintained, will solve the Pennsylvania deer problem. The maps in the concluding installment show the distribution of primary and secondary deer range, the prevalence of good, fair, and poor conditions, and 1938 deer populations as to whether abundant, common, or sparse. A table shows the kill per season from 1923 to 1937, inclusive.

Pollution

Moffitt, James, and Robert T. Orr. Recent disastrous effects of oil pollution on birds in the San Francisco Bay region, California Fish and Game (Ferry Bldg., San Francisco, Calif.), 24(3), July 1938, pp. 239-244, figs. 84-85.

Effects following wrecking of a tanker carrying 65,000 barrels of crude oil. The "pollution extended along 55 miles of coast line, centering at the Golden Gate and reaching from 15 to 20 miles out to sea. Its effects were felt not only by species of birds occurring along the open coast but also by those forms inhabiting shallow bays. Among the offshore species of birds, California murres suffered most and the incident may have inflicted disastrous losses among proximal nesting colonies. Scoters and western grebes were species next in order affected. Offshore ranging forms such as murrelets and auklets, shearwaters and petrels were apparently spared because the oil did not extend sufficiently far from shore to embrace their habitats. In the quiet bays, western grebes, white-winged scoters, ruddy ducks, eared grebes and red-throated loons suffered most in the order named. Although several kinds of gulls [and shorebirds] were commonly observed in both habitats, so few were found incapacitated by oil that it was concluded that these birds escaped largely by reason of their feeding and resting habits."

Predation: Great horned owl as an indicator

Errington, Paul L. The great horned owl as an indicator of vulnerability in prey populations, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 190-205, 4 pls.

Author's abstract: "Study of the food habits of the great horned owl (Bubo virginianus), when combined with contemporaneous research on prey species in the same areas, may help to give a clearer insight not only into the mechanisms of predation but also into factors influencing the status of animal popula-

tions. Overpopulations, natural emergencies, destruction of habitats by man, among other phenomena, conspicuously increase the vulnerability of certain prey populations, and this seems to be particularly reflected by the response of the horned owl. The horned owl, moreover, is a fairly common predator over temperate North America and, under favorable conditions, may be studied with comparative facility by means of pellet analyses. It is suggested that many workers on population or life history problems might find advantageous the examination of horned owl pellets in connection with their primary investigations." North-central States. Bibliography of 23 titles.

Predation: Gulls in murre colonies

Johnson, R. A. Predation of gulls in murre colonies, Wilson Bulletin (Sioux City, Iowa, 60 cents a copy), 50(3), Sept. 1938, pp. 161-170, figs. 23-24 (photos).

Review of literature (5 titles cited) and report on field work on the north shore of the Gulf of St. Lawrence. The great black-backed gull is the principal predator. Gulls whose eggs have been destroyed (by control measures or otherwise) do not leave the breeding area and being unoccupied are "at times more serious enemies to other nesting birds than x x x gulls which are allowed to breed normally." Under natural conditions, losses of murre eggs to the gulls are not excessive but under disturbance by man, those of whole colonies may be destroyed.

Predation: By hawks

Pough, Richard H. The biologist and hawks, Fur-Fish-Game (174 East Long St., Columbus, Ohio, 15 cents a copy), 78(4), Oct. 1938, pp. 14-15, 30, 2 photos.

Attempt to educate sportsmen in the theory of predation. Average behavior and diet of hawks must be taken into consideration; general conclusions can not be drawn from the activities of a single individual. Hawks are an age-long and integral part of American wildlife and "have as much natural right to a place in the woods and fields as any other native bird or mammal." Sanitative influence of predators on the population of prey species. Essential restriction of predation to surpluses that must disappear anyway. Limiting factors other than predators.

Propagation: Irradiation results

Bissonnette, Thomas H., and Albert G. Csech. Sexual photo-periodicity of raccoons on low protein diet and second litters in the same breeding season, Journ. Mammalogy (Wm. B. Davis, A. & M. College, College Station, Texas, $1.00 a copy), 19(3), Aug. 1938, pp. 342-348.

From the authors' conclusions: "If the small numbers of animals may be taken as representative, it appears that, with unfavorable diet, those subjected to experimental lighting were not so adversely affected by the lack of proteins as those on normal light cycles, so far as reproduction is concerned. x x x It does appear, however, that the experimental lighting and forcing of sexual

activation in early winter does not lessen reproductive effectiveness and it obviously offers the advantage to the young that they get a longer period of favorable weather and daylight in the spring and summer of their first year, after they are weaned and leave the den to forage for themselves.

"The litters produced from the second mating periods and born between July 28 and August 18 are evidence of increased breeding capacity of these animals, if first matings can be induced earlier in winter. x x x The litters born from these second matings were all suckled properly except one born on August 18 and at once deserted. All the others lived well and were weaned normally. They will doubtless be large enough to be liberated next spring.

"The young from the early matings were sufficiently grown in August and all were liberated then. This reduced the cost of producing young raccoons for liberation to a little more than one-half that required for those born at normal times, for they usually have to be carried over the first winter before being sufficiently grown for success in the wild. When this saving is added to that resulting from second litters in the same season, from even a few females, the total is quite considerable."

Research: Forest wildlife

Couch, Leo K. Forest-wildlife relationship: What has been accomplished through research, Journ. Forestry (Mills Bldg., Washington, D. C., 50 cents a copy), 36(9), Sept. 1938, pp. 913-915.

This is the Biological Survey's contribution to an issue of the Journal of Forestry that is largely devoted to a report of progress under the McSweeney-McNary Forest Research Act. It reviews work that has been done at 7 forest research stations and suggests that, "Future research should deal with the forest ecology, the influence of silvicultural methods and land use practice on wildlife." The lines of work, according to stations, were: California, rodents in relation to reforestation and range productivity; Lake States, snowshoe hare depredations on forest plantings, distributing deer populations so as to minimize the bad effects of yarding, food requirements of beavers; Pacific Northwest, protecting forest nursery stock from hares and rodents, rodent repression of new forest growth on burns, effects of rodents on the range; Northeast, forest and game management practices in relation to ruffed grouse; Appalachian, rodents and birds affecting pine reproduction, incipient overpopulation of white-tailed deer, change of wildlife food habits in response to fluctuations in mast and other supplies; Southern, birds as checks on pine regeneration; and Southwestern, jack rabbits and rodents in range ecology, and porcupines as affecting timber production.

Research: Hair identification

Mathiak, Harold. A key to hairs of the mammals of southern Michigan, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 251-268, 38 figs.

Author's abstract: "Hair structure, types, and pigmentation are discussed. A compound medulla common to hairs of certain rodents is called the 'rodent base.' Guard and intermediate hairs form the basis of the key which

consists of two parts separated according to size relationships. Criteria used in the key are scale form and the character of medullae and cross sections. Notes are given which supplement the data in the key. Small head and leg hairs and other hairs difficult to identify are placed in a miscellaneous group which includes hairs of domesticated animals." Bibliography of 14 titles.

Research: Hair identification

Williams, Cecil S. Aids to the identification of mole and shrew hairs with general comments on hair structure and hair determination, Journ. Wildlife Management (Victor H. Cahalane, National Park Service, Washington, D. C., 75 cents a copy), 2(4), Oct. 1938, pp. 239-250, 1 pl., 9 figs.

Author's abstract: "Elements of hair structure used in identification of mammal hairs are defined and illustrated. In moles and shrews, the more diagnostic characters pertain to hair shape, medulla type, and relation of medulla to other structural elements. Distinctions between hairs of bats and mice and those of moles and shrews are discussed, and differences between the hairs of mole and shrew genera are set forth in a key and in descriptions of each genus. Camera-lucida drawings are given to facilitate interpretation of the structural features. The following mole and shrew genera are treated: Neurotrichus, Parascalops, Condylura, Scalopus, Scapanus, Sorex, Blarina, Cryptotis, Microsorex, and Notiosorex." Bibliography of 8 titles.

WILDLIFE RESEARCH AND MANAGEMENT LEAFLETS

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of these mimeographed leaflets can be obtained from the Biological Survey, U. S. Department of Agriculture, Washington, D. C.

BS-119. The coordination of mosquito control with wildlife conservation, by Clarence Cottam, 6 pp., September 1938.

Abstracted elsewhere in this issue of WILDLIFE REVIEW (pp. 13-14) from Proc. 25th Ann. Meeting N. J. Mosquito Extermination Assoc. 1938, pp. 217-223.

BS-120. Botulism, a recurring hazard to waterfowl, by E. R. Kalmbach, 8 pp., September 1938.

Review of the history of knowledge of the subject and summary of information accruing since the author's comprehensive report in 1934. Outbreaks since 1932 in the United States, Canada, and Australia are reported. A final section discusses safeguards for the future. Bibliography of 5 titles.

BS-121. Two home-made traps for English sparrows, 6 pp., 3 pls., October 1938.

Brief summary of information as to the introduction, spread, and economic status of the species. Methods of preventing damage especially by reducing numbers by trapping. Traps are described and illustrated.

NOTES AND NEWS

Within the recently established Arizona No. 3 Grazing District in Yuma, Maricopa, and Pima Counties are areas that are dry, rugged, and generally inhospitable to domestic animals but are vitally important to native species of wildlife. Especially are they strongholds of the rapidly disappearing desert bighorn or mountain sheep. Also, they contain rare species of cacti and palm which merit preservation and invite scientific study.

Responding to suggestions that native plants and animals be protected, the Division of Grazing has requested the National Park Service to join in a survey that would look to setting aside certain areas within the grazing district in which the primary consideration will be the allotment of lands for the benefit of native animals and birds.

A recent news item is to the effect that a nonpoisonous shot has been patented by Michael G. Corson of New York City. It is stated to be an alloy of about 95% zinc and the remainder aluminum, that can be manufactured by the same process as lead shot.

Correction. Due to misinterpretation, the statement was made in WILDLIFE REVIEW, No. 15, July 1938, p. 20, that damage by porcupines is not important in the San Juan National Forest. The author of the paper abstracted states in a letter of September 12, 1938, that the damage is serious and that he will be glad to have the erroneous impression corrected.

ADDENDUM

Education: Wildlife management

Wight, H. M. Field and laboratory technic in wildlife management (University of Michigan Press, 311 Maynard St., Ann Arbor, Mich., $1.50 a copy), 107 pp., 34 figs., 1938. Lithoprint.

This publication, arriving too late to be included at the proper place in this issue of WILDLIFE REVIEW, should, however, be promptly brought to attention. Developed from a mimeographed aid to teaching in Professor Wight's classes, it is issued in this improved form in response to outside demand. Its primary purpose "is to present accurate, rapid, and concise methods of obtaining scientific information in the field of wildlife management." The chapters are entitled: The scientific method, Observations and notes, Cover maps, Census methods, Collecting, Animal records and specimens, Food habits research, Activity of animals, Life history studies, and General technic. Each is accompanied by reading lists, chiefly of papers by University of Michigan people, and by occasional directions and questions for the student. It contains a previously unpublished key to breast feathers of the orders of nearctic birds. It is of particular value in making more available the extensive writings of the Michigan wildlife management group but should be generally

useful to many teachers and students in its as yet inadequately documented field.

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WILDLIFE REVIEW

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UNITED STATES DEPARTMENT OF AGRICULTURE

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All of the abstracts in this issue of WILDLIFE REVIEW are of papers appearing in the

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Washington, D. C. No. 17 December, 1938

The Transactions of the Third North American Wildlife Conference, a paper-bound volume of x+901 pages, published in November 1938, may be obtained from the American Wildlife Institute, Investment Building, Washington, D. C., for $1.00 a copy, postpaid.

Biological Survey: Canadian big game

Anderson, R. M. The present status and distribution of the big game mammals of Canada, pp. 390-406, 11 maps.

Factors affecting wildlife, including lumbering, farming, trapping, and the introduction of improved firearms. Protection now afforded mammals. Discussion (in 10 cases with maps showing past and present distribution) of the status of the following forms: Buffalo, musk-ox, antelope, elk, eastern woodland caribou, western woodland caribou, mountain caribou, barren ground caribous, mountain goat, bighorns, mule deer, white-tailed deer, moose, black bear, and grizzly bears. Bibliography of 12 titles.

Conservation: Fur animals

Hamilton, W. J., Jr. The conservation of the nation's fur resources, pp. 518-523.

Fur animals are a natural resource of the first rank and returns from trapping are of vital importance to certain low-income groups. Indications are, however, that they are decreasing at an alarming rate. Overtrapping and other factors responsible for the decline are discussed. Conservation demands good management and that in turn depends upon adequate research. Notes on what is being accomplished and suggestions as to what may or should be done in the way of fur animal research. Need for public education on proper trapping practices and for cooperation of the fur industry in practical conservation and in support of research.

Conservation: In Mexico

Zinser, Juan. A message from Mexico, pp. 10-15.

Establishment of 25 national parks as a speedy method of checking inordinate lumbering operations and illegal killing of game. Restrictions on quail exportation permits; no wild turkeys can be exported. Description of two game reserves, one in Chihuahua, the other in Sonora. A study of predatory animals in Guerrero revealed pumas high, and white-tailed deer low, in numbers. No action was taken and in 2 years the ratio was reversed. "There was a remarkable decrease in the number of pumas and on the other hand, deer had multiplied to an extraordinary extent. The hand of man had no part in this change, but only the action of nature." Exploitation of guano deposits and of guano birds has been forbidden by presidential decree. Meanwhile the situation will be studied with a view to formulating appropriate legislation and regulations.

Conservation: Waterfowl

Lloyd, Hoyes, Juan Zinser, and Frederick C. Lincoln. What is the status of waterfowl?, pp. 161-171.

Lloyd. Summary for Canada by Provinces. The situation is not wholly good nor wholly bad. Restrictions on hunting seem to have checked the downward trend. With continued patient cooperation it seems possible that the waterfowl may be brought back to modest abundance. The only danger would appear to be too optimistic a view of the situation.

Zinser. A conservation campaign, both educational and coercive has been required in Mexico. Armada shooting is being done away with. Geese were more numerous than the previous year. The status of wild fowl is briefly noted. Upland plover have been given complete protection.

Lincoln. Report on breeding ground surveys, flyway studies, and the January inventory of waterfowl. An increase in the population of from 10 to 20 percent over that of a year ago is indicated. This does not justify great optimism as the total number of migratory wild fowl probably is not more than half what it was a decade ago.

Control: Cultural methods

Spencer, Donald A. Cultural methods and other practices used in the control of injurious wildlife, pp. 699-704.

Cultural methods are those involving modification of agricultural practices; examples are given. Defensive control is discussed under the heads of scarecrows, repellents, fences, and transfer of offending animals. Aggressive methods are illustrated by the New England field mouse control campaign which is fully described, particularly as to safeguards employed. (Abstract from WILDLIFE REVIEW, No. 15, July, 1938, p. 42.)

Destruction: Migratory wild fowl

Pearson, T. Gilbert. International migratory bird protection on North America, pp. 197-200.

Brief history of efforts at international bird protection in Europe negatived to a considerable extent by Italy's abandoning all restrictions in reprisal for strictures on its Ethiopian campaign. In the western hemisphere there are 10 countries in which there is not the slightest protection for birds. South of Mexico there are no game wardens. In the West Indies shore birds and ducks are slaughtered both by residents and by tourists from the United States. What we go to such lengths to protect on the mainland is there wantonly destroyed. While tinkering with a leaky tap the bunghole has been left wide open.

Diseases and Parasites: Of bighorn sheep

Potts, Merlin K. Observations on diseases of bighorn in Rocky Mountain National Park, pp. 893-897.

The bighorn has been greatly reduced not only in contrast to its numbers when the West was first invaded by white men but also in very recent years for which definite records exist. Scabies, doubtless contracted from domestic sheep, is known to have killed bighorns. This paper reports field observations and autopsies revealing hemorrhagic septicemia and lungworms, followed by infection with Corynebacterium pyogenes, and other bacteria. Weakened resistance due to malnutrition is indicated as the principal predisposing cause of the disease which has caused alarming mortality. To save the bighorn, it is essential that adequate year-round range and isolation from domestic stock be provided and that hunting be stopped.

Diseases and Parasites: Botulism

Coburn, D. R., and E. R. Quortrup. The distribution of botulism toxin in duck sickness areas, pp. 869-876.

Review of early studies to demonstrate the presence of preformed toxin in the field shows that Gunderson in 1931, working at Tule Lake, Oregon, was the first to prove conclusively that such preformed toxin did exist in natural media. Twenty-nine percent of the suspected samples examined in this sickness area showed the presence of botulinus toxin. Demonstration of preformed toxin under natural conditions in the field was made from carcasses of birds which had died of botulism; also in the surrounding shallow water, in the mud underlying such bodies, and in sarcophagid fly larvae feeding on these carcasses.

The possibility of toxin production on other natural bird foods has been demonstrated by the use of these as culture medium in tests with artificial incubation. Gunderson produced potent toxin through the use of grains commonly employed in baiting ducks. Suspicion was cast by Kalmbach and Gunderson on the surface slime and silt rich in organic matter which overlies much of the low marsh lands. Studies by the authors have demonstrated that the suspected ooze can and does act as culture medium for the production of the toxin. In decaying bodies of birds the toxin is produced under favorable conditions in from 3 to 4 days. The time during which it may be lethal depends upon numerous factors, chief of which are dilution by water, dissociation by sunlight, oxidation, neutralization, and fixation by organic acids. Greatest losses of wild fowl ascribed to botulism in the inter-mountain region have come in seasons of drought followed by heavy rainfall in August and September. The greatest bacterial activity takes place during the time required for 2-3 inches of water and the underlying ooze to evaporate to dryness. Drying does not destroy the toxin, but leaching and complete submersion with the attendant dilution renders it harmless. Re-evaporation, however, may concentrate the poison and again make it lethal for birds. Wind also may push water over flats with resulting formation of toxic pools when the water recedes. Descriptions are given of 5 typical, though dissimilar outbreaks of botulism, and suggestions made in each case as to how the difficulty can be eliminated.

Diseases and Parasites: Enlarged spleen in deer

Aiton, John F. Enlarged spleen in whitetail deer at Glacier National Park, pp. 890-892, 1 table.

Weights of deer and their kidneys and spleens tabulated; lesions spleen described; no diagnosis of cause.

Diseases and parasites: Malignant edema

McKenney, F. D. Malignant edema in deer, pp. 886-889.

From author's abstract: The malignant edema group of organisms is frequently responsible for disease in domestic animals, particularly sheep. One outbreak of this malady in deer has been reported and unpublished records show that the same organism has been identified in autopsied deer in various parts of the country. This report deals with a recent outbreak of disease in deer from which the bacterium causing malignant edema (Clostridium septique) was isolated. Remarks are made on the growth and other characteristics, including its effect when injected into laboratory animals. From a study of the gross and microscopic changes present in deer dying from the disease, it is concluded that the malady can not be diagnosed on the basis of post-mortem findings. It is believed that the difficulty attendant on culturing and identifying the bacillus, which will not grow in the presence of oxygen, may in part be responsible for the failure of other workers to attribute the death of deer occurring under similar circumstances to the malignant edema group of bacteria. Since the organism is ubiquitous and in the past has been associated to some extent with putrefactive processes, there may be a tendency to neglect it as a causative agent in disease. Further data are necessary to determine the extent of occurrence of this malignant edema, percent of mortality in deer resulting from it, and the means by which spontaneous infection becomes disseminated.

Diseases and Parasites: Sarcosporidiosis

Shillinger, J. E., and P. W. Wetmore. Sarcosporidiosis a protozoan disease of wildlife, pp. 898-901.

While numerous abnormalities in wildlife evade popular notice, infestations with Sarcosporidia are often so conspicuous as to attract attention. Cattle, sheep, and a great variety of wildlife are now known to be affected by this protozoan, the cosmopolitan representation of which probably can well be considered a single species, S. miescheriana. The life history and pathology of the organism are little understood. The greatest loss now attributable to it is waste of meat of various kinds rejected because of gross infestations. Bibliography of 7 titles.

Diseases and Parasites: Shock disease in snowshoe hare

Green, R. G., C. L. Larson, and D. W. Mather. The natural occurrence of shock disease in hares, pp. 877-881.

Some of the extensive decimations of snowshoe hares (the "drop" in the cycle) are described. During the most recent die-off, numerous hares were observed dying of the condition later recognized as shock disease. Lesions and symptoms are described.

Authors' abstract: "Spontaneous deaths of snowshoe hares from shock disease have been observed under natural conditions and studied intensively in fenced areas of natural cover. Shock disease develops in young hares during the summer and may produce heavy mortality within five to seven weeks of birth. Shock disease has been shown to involve hare populations to a degree that corresponds to the extent of the mortality which has been observed during the die-off period. It is concluded that deaths fundamentally due to shock disease are responsible for the periodic decimation of snowshoe hare populations." Bibliography of 6 titles.

Diseases and Parasites: Tick fever, deer in relation to

Shillinger, J. E. Deer in relation to fever tick eradication in Florida, pp. 882-885.

Brief notes on the fever, its vector, Boophilus annulatus, the control campaign against which from a territorial point of view is 90 percent completed. In central and southern Florida, however, there is a variety of the tick that lives upon deer as well as upon cattle. It must be controlled to complete the conquest of cattle fever in the United States. Since it is not possible to disinfect the deer as is periodically done with cattle, the elimination of most of the deer in certain districts in Florida appears to be the remedy. The infested areas in the State are relatively small and the total number of deer to be removed represent only a small percentage of the entire deer population. Undesirable as this process may appear to some people, it will affect comparatively few hunters. If it has the ultimate result of reducing the degree of tick infestation on the remaining and future deer population in Florida, the process will be worth while from that point of view alone.

Precedent for wholesale destruction of deer exists in the elimination of deer in certain areas in California in 1924, during the outbreak of foot-and-mouth disease in that State. After a very few years the area in which the deer were slaughtered became abundantly restocked by immigration of animals and by rapid reproduction. Undoubtedly eradication in Florida would be followed by similar prompt recovery of the deer population.

Ecology: Appraisal of quail habitat

Massey, A. B. A yardstick for measuring the habitat of the bobwhite quail, pp. 782-786, 7 graphs.

Segregation of the data on food in Stoddard's "The Bobwhite Quail," etc., (1932) by classes and presentation of graphs to show their seasonal utilization. Discussion of possible values in connection with physiological requirements of the birds. A bobwhite range lacking in any of the principal classes of nutriments is not suitable habitat. Appraisal of quail environment should determine whether there are available native plants of types that will satisfy the dietary needs of the species.

Ecology: Census methods, pheasant

Bennett, Logan J., and George O. Hendrickson. Censusing the ring-neck pheasant in Iowa, pp. 719-723.

Authors' abstract: In the winter of 1935-1936 Iowa suffered the most severe weather ever recorded. During the fall shooting season of 1935 about 50 percent of the ring-necked pheasants were taken and the severe weather exacted a further toll of about 25 percent. The following summer the Conservation Commission realized that a very close check should be made to determine if Iowa had enough pheasants to justify an open season. Recalling observations made during years of abundance, it seemed that the number of birds seen along secondary gravel roads in the early morning and late evening to some degree indicated the population. The writers, therefore, developed a plan under which conservation officers drove in automobiles at least 20 miles on gravel roads in three parts of a county on three successive days between the hours of 6:00 and 8:00 A.M. The total number of birds observed divided by the total miles gave the average number of birds recorded per mile. It was found that 8-10 birds per mile indicated a population of one bird to four or five acres; 2 birds a population of 1 to 7-9 acres; and one, a population of 1 to 18 acres. Surveys were made by the method indicated and in most cases by the same men in a given territory in both 1936 and 1937. The comparative figures of the two years gave the relative increase or decrease of the pheasant population in each county. In 1937 the figures showed a decided decrease in the population under that of 1936 and enabled the Conservation Commission to close the season with a minimum of criticism. Previous to 1936 the Commission used a mass driving method to census pheasants at a much greater cost and with unsatisfactory results. The present method is performed during regular patrol hours by conservation officers at no extra cost to the Commission.

Ecology: Drainage operations

Cottam, Clarence, W. S. Bourn, F. C. Bishopp, L. L. Williams, Jr., and William Vogt. What's wrong with mosquito control?, pp. 81-98.

Cottam and Bourn. Mosquitos may legitimately be controlled but methods that are needlessly detrimental to wildlife should not be used. A large percentage of mosquito-control projects hitherto conducted in this country, however, have been unnecessarily destructive either to wildlife or to its habitat. Figures are given on the extent of ditching in both fresh-water and brackish environments. Salt-marsh ecology is described both before and after drainage and the reduction in invertebrates in the various vegetative types (43-92 percent) emphasized. The destruction of these animals and of wigeon-grass in drained ponds has greatly reduced food supplies for wildlife. Use of non-volatile oil, also extensive, is destructive and should be abandoned in favor of the harmless as well as more economical pyrethrum larvicides. Biological methods of control are most acceptable to conservationists and their possibilities for development have not been exhausted. It has been demonstrated that necessary mosquito control can be correlated with wildlife conservation.

Bishopp. Mosquito control might be criticized because it was not started soon enough nor done with sufficient thoroughness. Recent operations with emergency labor, while subject to criticism, are not a fair sample of anti-mosquito work. Not all wildlife proponents condemn mosquito-control operations; supporting letters from two in the eastern salt-marsh region are quoted. Notes on human and animal diseases transmitted by mosquitoes and their importance. Benefits of mosquito-control in farming, recreational, and residential areas. Mosquito control workers want to see wildlife conserved and while exercising necessary control of these pests will do it with the least possible disturbance to wildlife. Research directed toward improvement in methods is needed.

Williams. In answering the question, "What's wrong with mosquito control?", this speaker would reply that there isn't enough of it. He admits the possibility of some mistakes in the ditching to control malaria mosquitoes but thinks that the number is so small as to be negligible. Drainage during settlement of the Upper Mississippi Valley is what made that area habitable by a healthy population. Today the movement has been reversed and water is being impounded; malaria is returning and will increase. Malaria costs the poople of the South about half a billion dollars a year. "I doubt if the small amount of damage that antimalaria drainage does to wildlife is even a fraction of what it is costing the people of this country to keep malaria." Those impounding waters should at the same time adopt measures to control the breeding of mosquitoes.

Vogt. Mosquito control that is intelligently conceived, expertly prosecuted, adequately maintained, and completely justified is non-existent. Ditching has been so extensive that communities do not appropriate the funds necessary for maintenance of the ditches, and an uncared for ditching system may intensify rather than abate the mosquito nuisance. Mosquito control is not as effective as claimed and does not justify the great expenditures that have been made. Malaria has increased in the Southeast at the same time that an intensive ditching campaign was under way.

[Comment. Discussion participated in by the speakers cited and others is reported on pp. 98-107 but is not abstracted. To an innocent bystander, it seems that these panel discussions "generate more heat than light' and verify the adage that "a man convinced against his will is of the same opinion still."]

Ecology: Drouth versus wildlife

Wade, Douglas E. Drouth intensity measurements and the effects of the 1936 drouth on wildlife, pp. 558-569, 2 figs., 6 tables.

Author's abstract: "The first five and one-half months of the growing season of 1936 were characterized by record-breaking temperatures and lack of moisture. The Munger drouth intensity index used on Madison, Wisconsin, weather data, provided a workable method in comparing one growing season with another and in correlating the effects of the season's drouth on animal populations, movements, food habits, and physiology.

"A brief review of other writers shows the scope of work already done on the effects of drouth on wildlife. Tomatoes grown in 1936 were deficient in vitamin C. This may offer a clue to the effects of drouth upon wildlife food. Further work in this field is suggested.

"Population statistics showed a state-wide decline of all game during the drouth season except pheasants. A theory is advanced that pheasants are an exception because of readiness to leave spoiled eggs in time to nest again. Game bird eggs in cooked condition were found during July. Quail in one area failed to reproduce heavily, and the young birds seen had been hatched late in the season. Quail in one instance erected a grass roof over the nest during a period of severe heat. Quail and rabbits performed unusual movements during July.

"Mice exhibited extraordinary food habits by girdling red-osier dogwood and yellow willow during July. Squirrels and sapsuckers fed on sap flowing from cracks in bark of silver maple trees injured by drouth. Drouth-killed trees attracted woodpeckers.

"Record soil surface temperatures during 1936 cooked the cambium layer of plantings, in some cases completely girdling the smaller trees. Larger trees escaped girdling but were defoliated on southern exposures. Plantings made in the open in 1936 suffered 90 percent killing as compared to 10 percent in 1937. Shrubs, vines, and trees planted in 1936 are tabulated according to their drouth-resisting ability.

"Certain wild fruits were found to produce heavily while others dried up or produced poorly.

"Drouth increases marsh hayfield burning and cattle breaching and thus results in loss of valuable coverts and destruction of nests. Drouth years are short-crop years and cut down the available amount of winter feed for wildlife."

Marshes and ungrazed woodlots are high-quality coverts that survive periods of drought and to preserve and increase them tends to insure wildlife against the effects of future drouths. Bibliography of 26 titles.

Ecology: Duck nesting cover

Bennett, Logan J. Redheads and ruddy ducks nesting in Iowa, pp. 647-650, 4 tables.

Author's abstract: "Although records do not exist, it is probable that the ducks named were common, if not abundant, breeders in Iowa prior to the time of intensive agriculture. Twenty-two redhead nests and 22 ruddy duck nests were studied in northwest Iowa from 1933 to 1937 in connection with other waterfowl research. Fifty-nine percent of the redhead nests and 63 percent of the ruddy duck nests were found among growths of Scirpus occidentalis, a bulrush that composed 30 percent of the available nesting cover. The proportions of other cover types and the number of nests of these ducks found in each are recorded in tables. 40.5 percent of all redhead eggs and 76.9 percent of all ruddy duck eggs deposited in nests produced young. The nesting season of the redhead was from May 17 to July 10. The nesting season of the ruddy duck ex-

tended from May 25 to July 25. Dense clumps of cover made accessible by open waterways appeared to be desired for nesting sites by both species. Muskrats made accessible large stands of bulrush cover for nest sites by cutting channels and other openings. There are notes on nesting losses and a table showing the number of nests that failed or hatched week by week.

Ecology: Duck nesting cover

Williams, Cecil S., and William H. Marshall. Evaluation of nesting cover for waterfowl on Bear River Refuge, pp. 640-646, 1 table.

Index values of cover plants to waterfowl obtained by dividing the percent of nests in a cover type by the percent of acreage of that type in the tract studied. These values are discussed and tabulated for 10 kinds of cover, of which hardstem bulrush (Scirpus acutus), while the least extensive, was the most valuable. The order of importance of the various cover types to 7 species of ducks also is stated.

Ecology: Forest wildlife

Horn, E. E. Some wildlife-forest relationships, pp. 376-380.

Forests are communities of interrelated living organisms in which it is impossible for any to function without affecting others. Life is sparse in dense, more abundant in open, forests. Fire and cutting are followed by great changes in the composition of the biota. Ground vegetation soon becomes established and improves the habitat for rodents, and later browse species similarly improve conditions for deer. Mice and chipmunks especially show a liking for coniferous seeds. In California they seem to prefer these in the following order: Sugar pine, Jeffrey pine, ponderosa pine, white fir, and incense cedar. This in the order of seed size but the same choice prevailed when the seeds were ground to a pulp. Few sugar pine seeds escape the rodents and reproduction of this species must depend upon a combination of favorable circumstances (heavy seed production, low consumption by animals, and favorable climatic conditions) which evidently occur only at widely separated periods. There seems a good possibility that parts of the sugar pine-fir-incense cedar associations may give way to fir-cedar because of seed-eating rodent activity. This will make a more closed type of forest and the change may have far-reaching effects upon the deer population. "A thousand acre experimental burn on the Lassen National Forest had the following effect upon wildlife: (1) Deer left the area before the fire and returned in increasing numbers the first year, attracted no doubt by new sprouting shrubs, and increased annual vegetation. (2) Rabbits, chiefly cottontails, were completely killed out, or the few survivors moved off immediately after the fire. Many carcasses were found. (3) Chipmunks were markedly reduced but not eliminated. A breeding nucleus survived at some of the rocky outcroppings. (4) Mice of the genus Peromyscus survived the hottest fire, and were caught in traps in the center of the burned area two days after the fire. Litters of these mice were caught, thus proving that the presence of mice was the result of survival rather than migration onto the burn from adjacent areas." Seed consumption by rodents greatly reduces the number of seedlings that might come up on these

brushfields after a burn. Burns discourage rabbits for several years, possibly due to scarcity of protective cover. Planting a burned area the first season following a fire is, therefore, a good way to avoid rabbit damage. Increase of rodents on recently burned areas attracts predators so that there may be a change in the predator-prey ratio that will affect valuable species. Many lessons for forest wildlife management may be drawn from these animal interrelationships.

Ecology: Reclamation in relation to wildlife

Page, John C., S. B. Locke, S. H. McCrory, and G. W. Grebe. What is or should be the status of wildlife as a factor in drainage and reclamation planning?, pp. 109-124.

Page. Speaking for the Bureau of Reclamation, the Commissioner reports cooperating with the Biological Survey and setting aside 28 reservoirs as waterfowl and wild life refuges; also that farmers on the Federal irrigation projects are deeply interested in wildlife conservation.

Locke. Magnitude of drainage, much of it unjustifiable. Value of the areas in their original conditions for wildlife production and other purposes. There is no overproduction of wildlife crops, and 17 million acres are needed for waterfowl refuges. There should, therefore, be no additional drainage except where value of the operation, including general public values, is demonstrated. Reclamation reservoirs are not of high utility to wildlife. Land-use policies should be sound and there should be some brake upon action so that projects will not be adopted until they have been approved by a competent agency.

McCrory. When a new drainage enterprise is proposed, there should be careful consideration of the advantages the area offers for different uses, including wildlife production and recreation. "Without proper drainage on his farm a farmer can not be successful" and his needs should be sympathetically considered by conservationists. The Upper Mississippi Wildlife and Fish Refuge as an example of careful planning and of cooperation between all interests concerned. Similar policies have guided consideration of farm drainage proposed as CCC projects. Nearly all classes of people are interested in wildlife but some of them could well do a little more effective thinking about it.

Grebe. "Irrigation as a whole, as distinguished from drainage, has created more wildlife environment than it has destroyed." Ignoring the original biota, habitat for wildlife is improved by irrigation, including food and cover in addition to the water supply. Auxiliary reservoirs make excellent retreats for wild fowl. Irrigation developments in the Boise Valley, Idaho, have increased wild fowl a hundred-fold in 30 years. Discussion of defects in irrigation practice in relation to wildlife, chiefly to fishes. "Reclamation of lands by drainage of swamps or natural lakes, on the other hand, is destructive of all forms of wildlife and should never be undertaken unless and until it can be shown that flooding of other lands will provide an equally successful wildlife environment. The status of wildlife as a factor in drainage and reclamation planning should be such that wildlife be given full consideration before

any project is approved. The millions of people who are interested in conserving and restoring the wildlife of the American continent should be properly represented, and all facts, figures, and values adequately weighed and balanced."

Ecology: Ruffed grouse cover requirements

Bump, Gardiner. Analysis of certain cover requirements of the ruffed grouse in New York State, pp. 818-824, 3 figs., 3 tables.

The characteristics of the ruffed grouse likely to govern its utilization of cover apparently adapt the species to a wide range of environmental conditions. For 8 years these conditions have been studied on 4 widely separated but representative areas in New York. Cover requirements vary seasonally and cover classes available to the birds may be conveniently grouped as open land, overgrown land, woodland, and slashing. These are further subdivided into 12 types. Interpretation of cover utilization based on more than 13 thousand flushing records reveal that the most important characteristic of winter grouse cover is the presence of a substantial proportion of conifers; conifers are abandoned for hardwoods as spring advances, and are little used in summer when overgrown lands with abundant herbaceous growth are favored; "edge" types furnishing food and coniferous growths affording shelter increase in importance as fall progresses. Some 1,200 nesting records indicate a preference for sites in second growth hardwoods; and 1,500 brood records show that predominant use is made of overgrown land or woodland herbaceous cover. The findings are tabulated.

Education

Gootenberg, Phil, Ernest G. Albright, C. R. Gutermuth, and John C. Caldwell. Public apathy a problem of wildlife restoration, pp. 31-41.

For the relief of the problem posed in the title, all of the authors advise education, particularly of the youth. Gootenberg would do this through the press, Albright through a junior game warden patrol, Gutermuth through conservation clubs, and Caldwell through the schools. Methods and results are cited in greater or less degree by each.

Education: Wildlife management

King, Ralph T. What constitutes training in wildlife management?, pp. 548-557, 1 fig.

Author's abstract: "Training in wildlife management must include much of animal biology, environmental constituents and relations, and land utilization. These older fields of knowledge provide three of the four cornerstones that constitute the foundational basis of wildlife management training, viz., zoology, ecology, and economics. The fourth cornerstone is wildlife management techniques, a new field of knowledge and one that is peculiarly the prerogative and responsibility of the wildlife technician.

"Several of the special divisions of zoology, botany, forestry, agriculture, economics, and sociology are distinctly a part of wildlife management and contribute directly to training in this field. These divisions are listed and their contributions evaluated. Those phases of wildlife management not included in previously existing courses are considered and the necessity for and advisability of incorporating new courses in the curriculum is discussed.

"The importance of a background such as can be provided only by biological, ecological, economic, and historical knowledge is stressed and the complete dependence of wildlife management on the ecological approach and the economic point-of-view is reemphasized."

Bibliography of 9 titles.

Food Habits: Cottontail

Trippensee, R. E. Food relationships of the cottontail rabbit in southern Michigan, pp. 794-804, 4 tables.

Report upon a combined observational and experimental study of the foods and alimentary physiology of the cottontail. An extensive list is presented of trees, shrubs, and herbs eaten by this rabbit in Michigan, and a shorter one quoted for Connecticut. Three tables are devoted to experimentally determined preferences among leafy foods, barks, and coniferous transplants.

Author's summary: "(1) Cottontail rabbits show a seasonal rhythm in fat storage which appears to be related to physiological and weather relationship; (2) digestion of cellulose is probably by enzymes; (3) average daily solid food consumed is 55.23 grams and 92.09 grams of water for a 1,238.89 gram rabbit; (4) fecal elimination of rabbits takes place largely during the feeding period. Thus the presence of rabbit feces shows areas of feeding rather than specific territories of individual animals. As many as 352 individual pellets may be eliminated by one rabbit in a 24-hour period; (5) minerals are needed by rabbits and are obtained in roads or other places where soil is exposed; (6) rabbits use a wide range of plants in their yearly diet. They are selective and prefer some foods over others. Dandelion, alfalfa, and red clover are the choice summer foods and the bark of apple is high in the dietary choice whenever available as a winter food. The bark of black cherry, staghorn, sumac, and black raspberry canes also rate high; (7) the first choice of conifers seems to rest with the exotic species including the needles, stems, and buds of Corsican pine and Scotch pine." Bibliography of 8 titles.

Food Habits: Deer and elk

De Nio, R. M. Elk and deer foods and feeding habits, pp. 421-427, 2 tables.

Author's abstract: "Winter food supply is the controlling factor on the big game ranges of Montana and northern Idaho. Therefore, game population is directly proportional to the quantity and quality of the food supply available during the critical winter periods. Because of the controlling factor all big game studies have been limited to the winter ranges.

"To secure information that will eventually be incorporated into management plans the Forest Service of Region One has conducted game studies on winter ranges for twenty or more years. Beginning in the winter of 1933 all studies have been conducted systematically using standardized instructions, forms, and equipment. They have included projects on all of the winter game ranges of 17 National Forests. These Forests represent a gross area of 26,759,309 acres and a population of 109,037 deer and 37,545 elk (1937 census).

"Foods and feeding habits have assumed a high priority in the studies of deer and elk, with the determination of carrying capacities as the main objective. In making this determination, data have been collected on the species and volume utilized and non-utilized by deer and elk and the influence of snow depths and temperature upon this use and availability, also on the preference and nutritive values of the forage species utilized.

"Data collected by direct observations in band trailing, clipping and study plots, and stomach content analyses show a total of 225 different forage species utilized. 447 deer and elk stomach content samples have been collected in the Region over a period of four years, representing every big game area. Of these, 59 deer and 53 elk stomach content samples have been analyzed in detail. An analysis of the 53 elk records show that normally December is the month during which the consumption of grasses by elk decreases and that of shrubs and conifers increases. In April, utilization of shrubs and conifers decreases sharply and grasses increases correspondingly. In comparing the results of the analysis of food consumption of 53 elk and 59 deer based on quantity by weight, the deer consumption of shrubs in their winter diet is 52.53 percent while elk consumption is only 15.46 percent. On the same basis conifers for deer are 35.61 percent as to 11.75 for elk, grasses for deer 3.04 percent against 56.58 for elk."

A table lists forage species and gives data on their availability, utilization, and palatability. General observations relate to the effect of weather on movements and feeding habits of the animals, on critical winter periods, and on utilization and nutritive value of coniferous browse.

Food Habits: Elk

Baldwin, W. P., and C. P. Patton. A preliminary study of the food habits of elk in Virginia, pp. 747-755, 2 tables.

Authors' abstract: "The elk (Cervus canadensis) was exterminated in Virginia more than a hundred years ago. Recent liberations of western elk have resulted in established herds in Giles-Bland counties and Botetourt county. Field observations on their food were made in March, August, September, October, and November of 1937. In March, feeding was principally on the twigs of black locust, scarlet oak, wild cherry, and sassafras and the evergreen plants of wintergreen and galax. Summer and fall observations revealed New Jersey tea to be the major food, with galax and wintergreen being taken to some degree. Samples from eight stomachs collected in November of 1936 and 1937 were analyzed at the Section of Food Habits, U. S. Biological Survey. Over 100 different items were identified; the most important of these were grasses (26%), New Jersey tea (11.87%), galax (11.87%), wintergreen (9.12%), miscellaneous leaf fragments and vegetable tissue (6.12%), miscellaneous twigs and woody tissue

(4.00%), oaks (chiefly acorns) (3.63%), blueberry (2.25%), gill fungus (1.00%), and others. Approximately 50% of the total food in these November stomachs was eaten in green condition. [The food items are tabulated in detail.] A summary of the field observations and stomach examinations shows that the principal diet of elk in Virginia consists of grasses, available cultivated crops, galax, and wintergreen throughout the year, New Jersey tea during the growing season, and acorns, and twigs of deciduous trees in fall and winter."

Food Habits: Mourning dove

Knappen, Phoebe. Preliminary report on some of the important foods of the mourning dove in the southeastern United States, pp. 776-781, 3 tables.

Report on analyses of 219 stomachs from the region cited and comparison in a table of percentage ranking of leading food items of that section and of the United States (based on a thousand examinations). The diet in the Southeast is discussed by one- and two-month periods and by plant groups. The 10 groups of most importance in producing food for mourning doves in the South are grasses, legumes, composites, spurges, pines, pokeweed, cranesbill, sedges, chickweed, and smartweeds.

Food Habits: Utilization of woody plants

Van Dersal, William R. Utilization of woody plants as food by wildlife, pp. 768-775, 2 tables.

Food the greatest necessity for wildlife and adequate knowledge of it of corresponding importance to management. Comment on published information on food habits and tabulation of comparative plant utilization of 147 species based on search of the literature and of the stomach analysis records of the Biological Survey. The red cedar (Juniperus virginiana) stands at the head of the list and records of its utilization are separately tabulated. Discussion of points of interest brought to light by the compilation and emphasis on the need for much additional information. Bibliography of 30 titles.

Food Habits: White-tailed deer

Aldous, Shaler E., and Clarence F. Smith. Food habits of Minnesota deer as determined by stomach analysis, pp. 756-767, 4 figs., 2 tables.

Despite the title, this is a combined report on field and laboratory studies pertaining to deer of northeastern Minnesota.

From authors' abstract and conclusions: The stomachs examined were of 22 of the animals killed during the fall hunting season and of 52 victims of winter vicissitudes. The number of plants identified in the fall stomachs was 45 and in those of the winter, 25. Evergreens including balsam fir, pine, white cedar, and spruce formed a little over one-fourth of fall food but increased to almost three-fourths of the late winter feed. White cedar, the most valuable of the deer browse species, increased only 3%, the greatest bulk of the winter subsistence being derived from balsam and pine. Willows and poplars

formed 29% of the fall diet but decreased to less than 4% in the late winter. Species within the heath, honeysuckle, and birch families formed minor parts of the diet during both periods. A graph showing the availability of the different kinds of browse in the Superior National Forest and the results of browse utilization studies is presented. Three figures show diagrammatically percentages of frequency and volume occurrence of the foods eaten. The tables give: (1) A list of all foods identified, the number of their occurrences, and names of the parts eaten; and (2) a summary of availability of browse species and the degree of their use by deer in the Jonvick deer yard.

The conclusions drawn were: (1) The stomach analyses, together with available browse surveys indicate that the winter carrying capacity for deer in northeastern Minnesota is on the decline; (2) the browse species forming the greater part of the winter food are those most available but not of the greatest nutritional value; (3) many of the choice browse species are either uncommon or are becoming unavailable due to heavy browsing; (4) balsam fir may be a good deer browse when eaten in moderate amounts in combination with more nutritious foods, but when eaten alone or in too great a proportion to other foods is not capable of maintaining good health; (5) maple brush is the most available of the choice browse species in this area. Other kinds may be locally abundant but are more spotted in their distribution; and (6) the variation in availability of browse species in the different concentration areas indicates that conclusions and management practices will have to be developed and applied to quite limited districts.

Life Histories: Cottontail

Dalke, Paul D., and Palmer R. Sime. Home and seasonal ranges of the eastern cottontail in Connecticut, pp. 659-669, 4 figs., 9 tables.

Authors' abstract: "An intensive trapping experiment was carried on for a period of 15 months on a 471-acre sanctuary near Rockville. A total of 68 traps were used and located in 13 different cover types. These cover types are described, indicated on a map, and their areas and percentages of the whole tabulated.

"The greatest concentration of rabbits on the sanctuary occurred in the area of most interspersion of cover types including cultivated fields. The 0-10 year age classes of timber types, shrubs and sedge swamps are the most important permanent cover types. Identification of rabbits was accomplished by use of ear tags and colored celluloid washers. In this manner sexes could be distinguished in field. The trapping technique is described. Trapping success varied greatly and not entirely due to the number of traps in the field. Cloudy and partly cloudy days gave better results than clear or rainy days. Greatest trapping success occurred in November, March, and June. Restriction of cover in October and November tends to concentrate the rabbits in a smaller area. In March the breeding season begins with greater movement, especially on the part of males. In June the immature animals are beginning to move and were largely trapped. Although the number of traps in the field varied from 14 to 68, the average daily catch for any month never exceeded 3 rabbits. Males were retrapped from 3 to 16 times over periods varying from 66 to 435 days, and females from 3 to 40 times over periods of 59 to 388 days. There appears to be

no definite correlation between the number of times an animal is retrapped and the period over which the trapping occurred. For example, one animal was retrapped 5 times in 387 days and another 40 times in 344 days, while a third was retrapped 16 times in 69 days. Tables and charts give the details of retrapping success.

"The area occupied by females varied from 0.6 acre to 8.4 acres with an average of 3.0 acres. Male rabbits ranged over territories of from 0.5 acre to 21.6 acres with an average of 8.3 acres. Composite maps of ranges of males and females indicate that male territories may overlap 50-80 percent. Each male territory touched upon those of 4 to 6 females. There appears to be no habitual separation of either male or female territories. Less definite results, in these respects, were obtained for the young. Dispersal, however, does occur. Four rabbits were recovered 1.0, 1.1, 1.4, and 2.4 miles from points of tagging. They were not forced to seek new territory because of fire or flood and were not subjected to undue predation."

Life Histories: Cottontail

Hendrickson, George O. Winter food and cover of Mearns cottontail, pp. 787-793, 2 tables.

Iowa farms that may have sufficient winter food for cottontails are characteristically lacking in cover. Simple observation and pellet counts yielded more information than trapping. Rabbits found better cover in orchards than in bluegrass pastures and alfalfa fields. Individual cottontails were observed each to use a single form regularly and several other forms intermittently for short periods. Weedy growth, particularly foxtail (Setaria spp.), was used more for winter shelter than nearby evergreens, shrubs, brush piles, and cordwood stacks. Apple prunings were available and bark of apple (Pyrus malus) was fed upon in preference to that of 8 other species of woody growth in one locality, and sumac (Rhus glabra) used in preference to 11 other species of woody growth in a second locality. The utilization of several types each of cover and food is discussed. The author concludes that strips of grass along fence rows would enable the rabbit population to occupy larger areas.

Life Histories: Coyote reproductive cycle

Hamlett, G. W. D. Reproductive cycle of the coyote, pp. 524-526.

Report on a histological study of testes and ovaries collected at all seasons combined with a summary of field notes on breeding and on numbers of young in dens. The coyote has a definitely limited breeding season that is somewhat longer, however, in males than in females. Production of more than one litter in a year is highly exceptional. The period of gestation is 60-63 days, the average number of embryos in pregnant females 6.23, and of young in dens 5.7. (Abstract quoted from WILDLIFE REVIEW, No. 15, July 1938, p. 22.)

Life Histories: Duck nesting

Kalmbach, E. R. A comparative study of nesting waterfowl on the Lower Souris Refuge: 1936-1937, pp. 610-623, 1 fig., 5 tables.

Summary of results of a study of crow-waterfowl relationships in Canada that has already been abstracted in WILDLIFE REVIEW (No. 10, October 1937, pp. 9-10; No. 12, February 1938, p. 7). Similar work was continued on the Lower Souris Migratory Waterfowl Refuge in North Dakota through the two seasons reported upon. The technique of the nesting studies is described and the risk of predators being attracted to nests visited by man discussed. Destruction of nests by crows was much less than revealed in the Canadian studies, 1.7 percent for the first year and 3.4 percent for the second. On the Souris, skunks caused the loss of 30.4 percent of the nests in 1936. The next year after a control campaign, and also after there had been a great shift in the duck nesting area, the damage was reduced to 6.5 percent. Other causes of nesting losses also are discussed. Nesting densities are estimated and compared with those of the Bear River Refuge in Utah. The relative abundance and percentage of hatch of the 6 more common ducks is tabulated. Late nestings are more effective than early ones; details are presented in a table. Degree of concealment sought for nests appears to be a specific trait as the ranking of the species in this respect was the same in both seasons. In general, however, the results of the studies have so varied from year to year that a long-time investigation is clearly indicated as necessary to reliable findings.

Life Histories: Fox squirrel

Baumgartner, Luther L. Population studies of the fox squirrel in Ohio, pp. 685-689, 5 tables.

Author's abstract: "Population studies are being conducted at six stations representing as many habitat types. These include 13 woodlots with a total population of about 525 squirrels of which 389 have been trapped and tagged. Based on retakes, 141 squirrels tagged from September to December 1936 (with 24.81% repeating), the average squirrel moved 149 yards. Tagging to date indicates a normal maximum range of 375 yards from the point at which first trapped. Unpastured woodlots were found to have higher squirrel populations than pastured woods. Winter-fed woodlots contain higher concentrations than either pastured or unpastured woodlands where no extra food was supplied. Five different census methods were employed: Spot count, leaf nest count, exhaustive trapping, and two by mathematical computations.

"The sex ratio for the 362 squirrels handled from September 1, 1936, to January 1, 1938, was 48.89% male, with extremes of 83.33% in August to 38.89% in October. During the 1937 hunting season, 954 squirrels examined, which had been shot by hunters, were 55.5% males. Differential activity between the sexes explains apparent sex ratios at variance with the actual ratios.

"Twenty-five used dens were examined and detailed measurements taken. There appear to be two types of dens, a small shelter den and a larger den in which the young are born. The dens are used over again for years. The leaf-nest study covered 134 winter leaf nests and 101 summer leaf nests, a total of 235; their locations are described and classed by percentage of occurrence by sites.

"A survey of the fox squirrel harvest during the 1937 open season revealed that the average fox squirrel hunter hunted an average of 3.42 days and

killed an average of 3.47 squirrels. Average weights and measurements of 181 specimens are tabulated.

"Fox squirrels have been observed to eat 36 different kinds of food at various seasons of the year. The ten leading foods, in the order named, were: Hickory nuts, acorns, beechnuts, corn, black walnuts, buckeyes, maple seeds and buds, elm seeds and buds, hazelnuts, and blackberries."

Life Histories: Gray squirrel

Chapman, Floyd B. Summary of the Ohio gray squirrel investigation, pp. 677-684, 5 tables.

Carried out on State forests and game preserves, the ecology of which is briefly described, the study included an appraisal of land-use trends as they influence the gray squirrel, a survey of methods of harvesting the crop, examination of specimens in connection with a controlled shooting program, and certain phases of the life history of the species. Weights tabulated by years, and by sex and age classes; they varied remarkably. The sex ratio of animals bagged by hunters (tabulated) also varied greatly from year to year. Utilization of cavities in trees and leaf nests (of both temporary and of re-used types) is discussed. There are notes also on courtship and mating and parasites and diseases. A cycle of about 5 years probably occurs in the gray squirrel population of the middle west. The results of controlled hunting for three years are tabulated and discussed. Management suggestions are made under 16 headings. Bibliography of 12 titles.

Life Histories: Mourning dove, as a basis for open season

Pearson, Allen M., and Walter Rosene, Jr. Observations on the breeding season of the mourning dove in the South, pp. 865-868, 3 figs.

Report on a study of nesting, gonad development, and growth rate of young, in relation to setting dates for the open season. Authors' summary: "From the information obtained in this study it appears impossible in the southern States to establish an open season on the mourning dove that would neither interfere with the early breeding nor permit the taking of some 'undersized' young birds. An open season from November 20 to January 31 would interfere less with early breeding and at the same time insure the taking of birds of desirable size than would any other period of similar duration. A more nearly ideal season, of shorter duration, would be December 15 to January 15."

Life Histories: Ruffed grouse productivity

Edminster, Frank C. Productivity of the ruffed grouse in New York, pp. 825-833, 2 figs., 6 tables.

The theoretically potential productivity of a species is never even remotely approached actually due to the interference of numerous limiting and decimating factors. The relation of actual productivity to the brood stock

determines whether the population is increasing, decreasing, or static. In a stable population, annual increment equals the losses. The wildlife manager strives to so manipulate environment as to produce this result with population at carrying capacity and the greatest possible proportion of losses occurring from hunting rather than other agencies. The ruffed grouse being cyclic, however, does not have stable productivity. The variations in its rate of increase due to changing effects of the decimating agencies are, therefore, of special interest. Results are reported for an investigation carried on for 8 years on an area near Ithaca, N. Y. Sex ratio, breeding, number of eggs, fertility and viability of eggs, and nest survival were remarkably constant during the upgrade and peak phases of the cycle. Brood and adult survival showed great variation year by year and often considerable variation in single years among different coverts. The trend was of increasing populations for the first three years and was followed by a steady peak population except in 1935 when there were excessive brood losses. Productivity rates were fairly constant throughout except for the year 1935 but indicate a gradual lowering as populations approach either carrying capacity or saturation point. Comparison of productivity on an Adirondack area of connected coverts with that on the disconnected coverts near Ithaca shows that on wilderness range in New York it follows the same trend as on the broken covert range but is consistently lower. The life cycle of the grouse is symbolized and diagrammed.

Carrying capacity depends not only on qualifications of the range but also on those of the species. The chief factor in the latter respect is degree of tolerance of other individuals which determines what is saturation of environment for the species. In marginal to fair grouse range, environmental carrying capacity determines the limit of population density, hence productivity. In good grouse range, the saturation point of the species is reached before the potential carrying capacity can exert its influence and this species characteristic then becomes the ultimate modifying influence on productivity and determines the actual carrying capacity. Saturation point--hence maximum actual carrying capacity--is one bird per four acres of covert in New York. Average actual carrying capacities of most good disconnected range in New York is about ten acres per bird; for Adirondack wilderness range it is about a bird per 20 acres.

Life Histories: Sage grouse

Rasmussen, D. I., and Lynn A. Griner. Life history and management studies of the sage grouse in Utah, with special reference to nesting and feeding habits, pp. 852-864, 3 figs., 4 tables.

Report of progress on work undertaken by the Utah Cooperative Wildlife Research Unit. The original range of the sage grouse was limited to the arid plains of the intermountain and northwestern States and the southern border of the three southwestern Canadian Provinces, agreeing in its distribution with the sagebrush, Artemisia tridentata. Under pioneer conditions it was found in fourteen States and considered the leading game bird in nine of these. Although a number of states have had closed seasons for several years, during the past year, several other western States for the first time closed or greatly shortened the season on this grouse, which has in the past been their

leading game bird. The situation is serious and accurate fundamental information concerning the factors influencing numbers of the sage grouse is necessary if the species is to survive or remain an important game bird.

There is a detailed report on the food identified from 61 stomachs. Adults are highly vegetarian with sage brush and other composites contributing more than four-fifths of the diet. The young are more insectivorous but in a few months change to the adult regimen. The sage grouse does not compete with livestock but these animals spoil environment, particularly winter range, for the grouse. Seasonal activities are described, those of the nesting period in most detail. Observations on 161 nests are presented, particularly on their location in relation to cover types. The highest nesting density observed was 23 nests on 160 acres or 1 nest to 6.95 acres. Clutch and brood numbers and causes of nest failures are tabulated and discussed.

Life Histories: Wood duck

Gigstead, Gill. Wood ducks in the Illinois River bottoms, pp. 603-609.

From the author's abstract: In the lower Illinois River bottoms, wood ducks breed possibly more abundantly than anywhere. During two years observations were made on the birds from the time the first appeared in the spring until they departed in fall. In addition, 27 occupied nests were kept under close observation in the season of 1937 and data were secured on 31 other nests that had previously been occupied by wood ducks. The woodlands near the river provided nesting sites for many birds; 65% of the nests were in oak trees, while others were found in several other kinds. There appeared to be no set preference as to the kind of cavity the ducks would nest in, and great variation was found. Some nests were within 7 feet of the ground and others 35 feet up. The birds seemed to prefer to have the nest about two feet below the entrance. Some entrances were hardly 4 inches in diameter while others were as wide as 16 inches. Incubation was studied by taking a single egg from each of a number of nests and placing them under domestic hens. At the time of pipping the nests were watched until the birds emerged. Six broods were seen coming out of the nests and in each instance the young jumped from the entrance after being coaxed by the mother duck; no other method of emergence was observed.

Predation was most severe during the first week after hatching. Bull snakes did the most damage; a 57-inch snake of this species taken from one nest contained two young ducks and two eggs about to hatch. Other predators included the raccoon, mink, opossum, turtles, and fishes.

Wood duck management was practiced at the Chautauqua Migratory Waterfowl Refuge, 400 wood duck nests were constructed with CCC labor and placed in selected trees. 23 acres of food patch materials were planted along the levee of the refuge. The ducks showed a preference for Wheatland milo maize. Young wood ducks fed in ponds and ditches, sometimes where the only food available to them was insect life, especially larvae of May flies and caddisflies. Usually, however, there was considerable duckweed along these banks and the young birds manifested a great liking for these plants.

In the early fall the birds concentrate in definite locations; as many as 4,000 were estimated to be present in a large lotus bed. 200 wood ducks were banded before their departure in the fall of 1936. Returns were received from Texas, Tennessee, and Louisiana.

Rigid enforcement is of primary importance in restoring and maintaining this species. Refuges should be established where wood ducks are known to breed in large numbers. Nest boxes should be set up in areas attractive to them and where they were formerly known to be common, predator control should be practiced where wood ducks congregate. Literature describing these and other protected birds should be better circulated among hunters. Artificial propagation and restocking should be practiced where the birds have failed to return. Wood ducks should be forever protected. This magnificent species which nature has adorned so attractively should be preserved as a symbol of achievement in conservation.

Life Histories: Woodcock

Aldous, C. M. Woodcock-management studies in Maine, 1937, pp. 839-846, 1 table.

Report of progress in studies of migration, singing grounds, nesting cover, seasonal abundance, census methods, banding, losses due to predators and other causes, parasites, food habits (tabulation of principal items in 55 stomachs), and weights and measurements.

Management: Antelope

Einarsen, Arthur S. Life history and management of antelope in Oregon, pp. 381-387, 1 map.

About two-fifths of the State was originally inhabited by antelopes, but only half of that range is now utilized. The animals were heavily hunted and reduced by 1913 to about 2,000 head. From 1925 effective protection was extended and in 1936-37 about 17,000 antelopes were counted. The sexes are about equal in number; the birth rate seems to vary considerably and should be taken into consideration in fixing seasons and bags. Intrusion upon farm water holes and into hay and grain fields are resented. Water supplies should be developed to attract the animals to now little used parts of their former range. Discussion of factors bearing upon the hunting season, with recommendations. Regulations should be adjusted annually in accordance with existing conditions.

Management: Bobwhite

Wilson, Kenneth A. Quail management in Maryland, pp. 709-718, 2 tables.

Summary of 27 months' experience on a Farm Security Administration project. Description of tract and discussion of results as to food habit studies, food patches, plant transition studies, seed collecting, and census. The quail population increased 382 percent and the carrying capacity improved

to a bird to 7 acres in contrast with the original 1:35 ratio. Population densities are compared for different types of environment. The tables give details of the food habit study and of the census and list quail food plants of different types of soil. The author's summary is: "It was found that: (1) On the Eastern Shore of Maryland submarginal land is especially well adapted to multiple use conditioning because so much of one work dovetails into that of the other. Ditch drainage that creates better forest growing conditions likewise creates livable habitats for quail and other wildlife. Cultivated strips of land that grow food for quail also provide fire protection for the forest. Forest thinnings that release timber trees also release game food-producing trees and shrubs. (2) The provision of good drainage and substantial fall and winter food contributed more than anything else to the present increase of quail. (3) Where optimum escape cover exists, other things being equal, predator control is not necessary. (4) Land cultivation increases the food supply of hawks, owls, and other predators in the form of mice. (5) Plant transition from cultivated land to broomsedge is three years in badly acid soil and four years in clay. (6) From five to six years following broomsedge an understory of panic grasses, paspalums and partridge pea produce some fall and winter food for quail. (7) Well-drained, sandy soil supports abundant quail food-producing legumes, acid soil does not. Partridge pea is the only legume that grows abundantly in acid soil. (8) Partridge pea grows and produces seed equally well in heavy sour soil or light sandy soil; pure stands produced 330 lbs. of clean seed to the acre. (9) Ninety-two per cent of all the quail lived around cultivated land. (10) The following proportions of submarginal land are capable of supporting a winter population of one quail for each 7 acres: pine and mixed hardwoods, 72 per cent; swamp woodland, 10 per cent; broomsedge field, 8 per cent; brushland, 5 per cent, and fallow land, 5 per cent." Bibliography of 6 titles. (Abstract from WILDLIFE REVIEW, No. 15, July 1938, pp. 25-26.)

Management: Cottontail

Stuber, James W. Cottontail rabbit propagation, pp. 651-658.

The cottontail is the most popular game animal in Ohio and various other States. Propagation in confinement proving impracticable, restoration in the wild, aided by extensive stocking of propagation areas, has been tried. These breeding refuge tracts vary in size from 75 to 250 acres and are located in every county. Feed patches (soybeans, corn, sunflowers, clovers) are planted, and salt is provided in all of them the year round. Cover is improved by planting such crops as alfalfa, clovers, timothy, Sudan grass, and sunflowers, and by draping brush piles and briars with soybean and alfalfa vines. Groundhogs are advantageous in making winter dens and should be introduced where previously cut down by wanton killing. Cooperation of sportsmen in the program. Notes on diseases, life-history, restocking, and on predators and their control.

Management: Counting big game

McCutchen, A. A. Preliminary results of wildlife census based on actual counts as compared to previous estimates on National Forests, Region 2, pp. 407-414, 1 table.

Information on wildlife populations is the fundamental basis for management and it cannot be too accurate. Qualifications and training of counters. Complete coverage of the census area has proved most satisfactory; sampling is unreliable; airplane observation, insufficient in itself, is useful as a supplement. Notes on methods. Results of surveys do not agree very well with previous estimates. They are tabulated and discussed.

Management: Counting elk

Cahalane, Victor H. The annual northern Yellowstone elk herd count, pp. 388-389.

Methods, experiences; result in 1937, a combined count and estimate of 9,675 animals.

Management: Deer on the Kaibab

Boone, R. P. Deer management on the Kaibab, pp. 368-375.

The Kaibab Plateau, long famous for its productivity of mule deer, was mostly converted into a national game preserve in 1906. Then all killing of deer was prohibited, mountain lions and coyotes were killed, and an influx of domestic livestock begun. The increase in domestic animals was rapid, and the deer multiplied under protection so that by 1920 the carrying capacity of the range was greatly overtaxed. Adverse public sentiment hindered remedial action, but from 1923-26 a considerable reduction in livestock was accomplished and from 1924-30 the deer population was greatly reduced by hunting. The present paper reports in some detail upon seasonal ranges and movements of the deer, the principal food plants, and the degree of overbrowsing. Plantations and experimental cuttings were tested as means of improving the forage but both seemed impracticable. Clipping studies were made to determine resistance of food plants to browsing, and safe degrees of utilization. Experimental plots are maintained to determine the inter-relationship of grazing between deer and livestock. Life history of the deer is being studied from various points of view. Counts are being made of total numbers, sexes, and age groups. Removal of surplus deer includes does as well as bucks. Hunting is now regulated. Trapping for fur cuts down the number of coyotes and bobcats, and hunting of pumas for sport under special permits is allowed. The broad objective is to maintain control of all animals and to make each species contribute its share to recreational and profit-taking uses of the area.

Management: Fence rows

Edminster, Frank C. The farm fence in wildlife management and erosion control, pp. 583-591, 1 fig., 3 tables.

In general, farm fields lack year-round shelter; opportunity for improving cover lies mainly in fence rows. Shrubby fence rows harbor birds of value in consuming insects and weed seeds, act as barriers to soil erosion, serve as windbreaks, and produce wild fruits, some of which are gathered for home use.

"Clean farming" is continued not so much for proved utility as because it is fashionable. Reversing the trend is a problem in education, namely to make it "good form" to maintain hedgerows. Studies of environment in relation to the pheasant population in Seneca County, N. Y. showed that land with shrubby fence rows had materially greater carrying capacity than "clean farmed" areas. Authors are quoted to show similar effects for quail in Texas and California, and the Hungarian partridge in Michigan. Woody vegetation will come into undisturbed fence rows by natural processes, but may well be planted to hasten realization of benefits. Factors that should be taken into consideration in selecting planting material are mentioned under 12 headings and a table suggests woody plants suitable for the Northeastern States; gives information on their moisture and soil tolerances, height, and period of availability of fruit; and mentions kinds of wildlife the plants benefit. Bibliography of 6 titles. (Abstract quoted from WILDLIFE REVIEW, No. 15, July 1938, p. 27.)

Management: Food patches

Fry, John R. Wildlife food patches: Results of four years of observations in southwestern Wisconsin, pp. 730-735, 1 table.

Discussion and tabulation of the qualifications of tested grains as to yield, maturing season, freedom from disease, use by small birds, resistance to lodging, shattering tendency, and palatability. Yellow dent corn comes closest to being the ideal species. It is very desirable that seed for food patches be obtainable locally. A patch should be at least a quarter acre in size, near good winter cover, and preferably part of a regularly cultivated field. Bibliography of 5 titles.

Management: Forest game

Douglas, L. H. The principal factors controlling big game populations in the Central Rocky Mountain Region, pp. 296-301, 1 table.

Except in a few localities, forage is not an important factor in explaining present numbers of deer and elk. "The number of deer has no relation to the number of domestic sheep, but has a very distinct relation to the presence of game refuges where there is no legal hunting." Colorado forests are not overpopulated with deer and with added winter range could support more than twice the existing population. History of the deer, elk, antelope, and bighorn populations of certain areas and suggestions as to improved handling. "Excess killing where the numbers already are too small must end. Settlement on sub-marginal lands on old migration routes and winter range should be eliminated. Overstocking of spring, fall, and winter range by cattle and sheep should be reduced."

Management: Fur animals, Canada

Bonnycastle, R. H. G. Hudson's Bay Company, Canada's fur trade, pp. 531-537.

Brief reference to history of the Company. Comparison of fur catch and industry in the United States and Canada. The Hudson's Bay Company has been

in existence 268 years and now operates 230 trading posts. Fluctuations in populations of fur animals, some a matter of record for 150 years. Protection of fur animals by curtailment of trapping seasons and by restriction of trapping privileges to Eskimos and Indians. Account of a large beaver restoration project in Quebec and of a muskrat farm in Manitoba and other fur farming projects.

Management: General

Robertson, A. Willis, A. M. Day, and W. C. Adams. How the Pittman-Robertson Act will operate to restore wildlife in the States, pp. 56-65.

Discussion, necessarily in the future tense, of the apparent advantages and disadvantages of Federal aid to the States in wildlife restoration. Concrete suggestions by Day as to what can and cannot be done include the following positive endeavors: (1) The purchase of land for wildlife purposes, (2) the development of land to make it more suitable for wild animals and birds, and (3) research projects directed toward the solution of problems that stand in the way of wildlife restoration.

Management: Harvesting on controlled shooting areas

Gerstell, Richard. Measured game and recreational production on controlled shooting areas, pp. 570-575, 4 tables.

In connection with the Pennsylvania farm-game refuge program, three trial controlled shooting areas were established. This paper is a report on some of the results obtained during a biennium on two of the areas and for a single year on the third. Methods of establishment and operation are described and costs cited. The data presented are tabulated to show number of hunters using the areas, number of hunting hours and the average per man and per head of game bagged, the number of principal game species killed and the acres and hours involved. The possibility of collecting a great variety of information useful in game administration is pointed out.

Management: Harvesting deer

Seamans, Roger. The relation of the whitetail deer to habitat in Windham County, Vt., pp. 243-247, 2 tables.

White-tailed deer nearly extirpated from the State, were replenished with introduced stock in 1878 and later protected until 1897. The population built up most rapidly and withstood hunting better in Windham County where the study reported upon was made. Topography and vegetation of the area are briefly described, and the forest types tabulated for the 10 townships. The deer kill and the number of acres to each head bagged also are tabulated but there appear to be no correlations. One deer in the total kill represented acreages varying from 263 to 2,880 (average 770).

Management: Harvesting waterfowl

Wilson, Vanoz T. Management of waterfowl public shooting grounds, pp. 633-639, 3 tables.

Description of system in use on that part of the Bear River Migratory Bird Refuge, Utah, that is used for public shooting. Tabulation of the kill from 1932 to 1937 by years and species. In 1937 there were 2,532 hunters who made a bag of 7,809 ducks and geese, an average of 3.1 birds per man. The number of waterfowl taken is estimated at 1.5 percent of the average seasonal population and at about a fourth of the number bred on the refuge.

Management: Herd regulation

Schilling, E. A. Management of whitetail deer on the Pisgah National Game Preserve (summary of five-year study), pp. 248-255.

On this 100,000 acre tract deer increased until in 1929 they threatened the forest vegetation. Counts showed a herd growth from 1,000 to 9,500 in 17 years. The deer are a mixture of various subspecies and vary greatly in color, form, and weight. The herd instinct is not dominant. The animals are as much nocturnal as diurnal. Seasonal movements are governed almost entirely by food; they are briefly outlined. Breeding, molting, and antler development are briefly discussed. The sex ratio of trapped fawns was 53:47; in all probability that normal to adults is 50:50 or 1:1. Diseases and parasites are catalogued; they have caused no epidemics in the last 20 years. Food varies with the season; rhododendron is most important in winter; grass, other herbage and new growth on shrubs and trees in spring; acorns, beechnuts, and black gum berries in fall. Palatability ratings have been computed for 270 species. Winter food is the real criterion for establishing carrying capacity. Careful study showed this should be 2,500 deer as against the 9,500 actually present. These figures represent, respectively, one deer to 11.2 and 40.7 acres. The effects of overbrowsing on several common trees is described. The Pisgah deer herd is eating itself out of house and home and must be reduced. Reduction will be carried on until the proper carrying capacity is reached.

Management: Inventory, fur catch in Vermont

Davis, Geo. W. An analysis of Vermont fur dealer reports, pp. 504-507, 2 tables.

Author's abstract: "Reports of furs handled in Vermont for a two year period were studied. Number of pelts purchased are given for seasons 1935-36 and 1936-37. Value of annual crop is estimated by average prices reported by dealers. Discussion of market conditions and recommended legislative changes are mentioned."

The figures are 1935-36, 136,271 animals, value $280,000; 1936-37, 111,141 and $320,000.

Management: Inventory, Ohio game mammals

Hicks, Lawrence E. The status of game mammals in Ohio, pp. 415-420, 5 tables.

"Seventy species of mammals have been recorded for Ohio in historic times. Of these, 8 or 12% are moles and shrews, 10 or 14% are bats, 17 or 24% are carnivores, 30 or 43% are rodents, and only 4 or 6% are hoofed animals (big game).

"Of these eleven species no longer occur in the State. The extirpated species include: Wolverine, fisher, pine marten, timber wolf, Canada lynx, bobcat, mountain lion, snowshoe rabbit, elk, moose, and bison. Except for rats (from Europe) and the reintroduction of the white-tailed deer, no wild mammal has ever been successfully introduced into Ohio. The coyote has recently invaded from the west and the beaver (once present) has recently come in from the northeast.

"Four species, once thought to have disappeared, have recently been recorded: Black bear, American otter, American badger, and Canada porcupine. The gray fox, unreported for a number of years, has increased during the last two decades until it is very common in the southeastern fourth of the State. The white-tailed deer, once probably entirely extirpated, has spread from introductions in southern Ohio and has invaded from Pennsylvania and West Virginia until the last State census listed 1,750 individuals in 28 eastern and southern counties. The State mammal list in 1938 stands at 59 species."

A 5-year average catch of 7 kinds of fur animals is tabulated. The total is nearly 19 million and its value about 2 million dollars. Details are given for two counties. The relative abundance of three kinds of squirrels throughout the State is tabulated. The status and kill of the gray squirrel, fox squirrel, and cottontail are discussed. Bibliography of 16 titles.

Management: Muskingum Watershed, Ohio

Nesbit, Ray J. Wildlife management in the Muskingum Watershed Conservancy District, pp. 592-596, 1 table.

Description of this large flood control and water conservation project that includes 11 permanent impoundments. Opportunity for wildlife management is good on 60,000 acres of publicly-owned land and water. Some wildlife was destroyed by flooding but this loss is more than made up for by general improvement in the environment. Reservoir basins are cleared and debrushed to discourage occupation by wildlife. Numerous wildlife safety zones and propagation areas have been reserved. Winter feeding, stocking, and a small amount of localized predator control also are part of the program. Two entire lakes and parts of two others have been made sanctuaries, and several of the new reservoirs have been planted to sago pondweed. Food patches are established under a share-cropping arrangement with tenant farmers.

Management: Pests in relation to wildlife

Strong, Lee A. Insect and pest control in relation to wildlife, pp. 543-547.

Regulations designed to prevent spread of injurious forms, as barberries, bear upon planting for wildlife. Insecticides are prepared and used so as to be least harmful and experiments and observations demonstrate that the widely employed grasshopper bait, for example, when used as directed, is not detrimental to wildlife. Insects destroy food plants and their control may be important to wildlife. Again insect pests are directly injurious and insecticidal campaigns may provide relief. "The control of insects and plant diseases is merely a form of wildlife management, the object of which x x x is the greatest good to the greatest number."

Management: Planting for wildlife

Sharp, Ward M. Food and cover plant nurseries and planting out methods for wildlife in the Great Plains, pp. 538-542.

Many tree and shrub pioneers along watercourses in the Great Plains were carried there by wildlife; depletion of the woodland environment by man and domestic animals has, therefore, been immediately and seriously harmful to wildlife. In most tree planting projects the needs of wildlife received little attention. Temporary nurseries were established so that refuges could be economically supplied with acclimated stock of the species desired. Description of favorable site and the development and care of nurseries. Suggestions as to types of stock, field planting methods, and the factors that determine success (climate, grasshoppers, rabbits, gophers, livestock). Qualifications of species desirable for planting and list of recommended trees and shrubs.

Management: Refuges

Steen, M. O. Development of Federal refuges in the Great Plains region with emergency relief funds, pp. 628-632.

Projects sponsored by the Biological Survey and financed by the National Youth Administration and Works Progress Administration. Framing applications, details of financing, drafting of contracts, selection of personnel. Easement projects bring greatest returns for the funds invested. Eighty of these, totaling 130,000 acres, already established in northern plains states. Their value for water conservation, fur animal and waterfowl production, and recreation. The proportion of land now available for wildlife restoration is small and should be utilized as fully as possible. The easement refuge plan is capable of great extension and is the plan best adapted to privately-owned lands, the management of which will have a decisive influence on the future of American wildlife.

Management: Refuges

Stone, Howard L., J. C. Salyer, H. D. Ruhl, and F. P. Schwab. Is the Federal waterfowl refuge program proceeding wisely?, pp. 201-213.

Stone. Representing North Dakota, formerly the best U. S. wild fowl breeding area but transformed by drainage and drought, this speaker welcomes and approves the Federal waterfowl refuge program that is in part reversing former unfortunate land policies.

Salyer. The Federal migratory restoration program was thoroughly planned with the aid of information that had been accumulated through the whole existence of the Biological Survey--some 50 years. Information is given on the number, acreage, and classification of the refuges already acquired. They benefit water birds of all kinds, and improve the nesting and wintering grounds as well as the flyways of the migratory game birds. Drained or otherwise damaged sites were acquired as supplementing areas still in good condition; story of their development and improvement. Examples showing how the waterfowl are responding to the facilities provided for them. Notes on policing the refuges.

Ruhl. Large programs executed in a hurry cannot be free from mistakes but the Federal refuge work has proceeded more satisfactorily than could reasonably be expected. Refuges have their place but are not a flexible feature of wildlife management; regulation of seasons and bag limits are the most effective means of adjusting the annual kill to correspond with production. There should be adequate provision for public hunting grounds. The value of refuges as training places for personnel, and as outdoor research and demonstration areas. Maintenance must be provided for and the refuges should be made as nearly as may be self-supporting.

Schwab. Program approved; Iowa now has enough refuges but needs public shooting grounds. Constant management required to get the best results from a refuge system. It should be based on adequate research.

Management: Squirrels

Goodrum, Phil. Squirrel management in east Texas, pp. 670-676, 1 table.

Squirrels (southern gray and fox) are the objective of 85 percent of the hunters. They have been reduced by exploitation of their woodland environment. They have two breeding periods each year and the open season in every one of the 47 counties in their range in part covers these periods. A 2-month open season (Oct. 15-Dec. 15) and a bag limit of 5 are recommended. Good squirrel habitat cannot be made quickly, so that existing must be conserved. It can be improved, however, and suggestions are made. Light grazing may favor the squirrel population but overgrazing is detrimental. Notes on private shooting preserves, their regulations, and take are presented, the kill being analyzed with respect to acreage, hunters, and cost.

Management: Stocking Canada geese

Pirnie, Miles D. Restocking of the Canada Goose successful in southern Michigan, pp. 624-627, 1 photo.

From author's abstract: Since 1928, a captive flock of Canada geese has nested at the W. K. Kellogg Bird Sanctuary near Battle Creek. At first, the young were pinioned to add to the captive flock, but since 1931, less than two dozen of the young have been so treated, and more than 125 young have been allowed to fly as they please. Since about 1930, full-winged escaped birds have been nesting in this vicinity with an annual yield of young in excess of

those produced inside the Sanctuary. Geese have long stopped, spring and fall, in this vicinity, but nesting records were lacking until the time of these releases. There has been a great increase in local nesting away from the Sanctuary to distances of 20 to 40 miles. Gradually, since 1930, the number of wintering geese has increased from as few as 50 fliers to well over 300 in 1936-37. Some of these geese have become migratory, and seem to depart about the time of the late goose flight in November and early December.

Management: Stocking, climographic analysis

Cahn, A. R. A climographic analysis of the problem of introducing three exotic game birds into the Tennessee Valley and vicinity, pp. 807-817, 6 figs.

In general, animal species, subspecies, or races are confined to relatively limited areas having definite environmental factors to which the forms are physiologically, if not anatomically, adapted. Attempts at transplanting them to environment that is radically different, especially in the critical breeding season, therefore, are not likely to succeed. The climograph offers a means of determining in advance whether conditions in the proposed area of introduction are sufficiently similar to those of the native home to promise success. Climographic analysis indicates that neither the Hungarian partridge, ring-necked pheasant, or chukar partridge are suitable for stocking the Tennessee Valley region.

From author's summary: The Tennessee Valley has been used as an example merely because the writer happens to be working in that region. Behind the facts presented lies a much broader principle and a field of application of this method of environmental analysis far greater in scope than the Tennessee Valley. For if those organizations all over the country which are enthusiastically introducing exotics into their local regions at expenditure of effort and money, will calmly sit down, and with a sheet of graph paper plot comparisons of native environmental optima of the species they wish to introduce with local environmental conditions, they will have before them a safe guide to action that may save them thousands of dollars--and at the same time (what is more important, perhaps) save the lives of hundreds of thousands of birds, which otherwise would be sacrificed on the altar of enthusiastic ignorance.

Management: Stocking results, bobwhite and pheasant

Gerstell, Richard. An analysis of the reported returns obtained from the release of 30,000 artificially propagated ringneck pheasants and bobwhite quail, pp. 724-729, 5 tables.

The Pennsylvania Game Commission bands or otherwise marks practically all animals used in its stocking operations. This paper reports certain results from about 15 months' experience with pheasants and quail. From one lot of 2,000 pheasants a return of 19.1 percent was obtained the first season and only 0.9 percent the second. The returns from first class range averaged more than thrice those from second rate environment. This trend was paralleled by results from a second and larger release in 3 grades of range. Returns from spring stocking were less than a fifth of those resulting from fall operations.

From 39 to 54 percent of the birds were killed in townships other than those in which they were released. Individual movements up to 35-40 miles airline were not uncommon. The findings indicate that birds released in first class pheasant territory tend to evidence comparatively limited movement and to yield high returns, while those turned out on inferior ranges show wider movements and lower returns. Summarized results from more than 12,000 stocked bobwhites show a much greater discrepancy between returns of spring and fall planted birds.

Management: White-tailed deer

Adams, Harry E. Deer census and kill records of the Lake States, pp. 287-295, 3 tables.

Author's abstract: "This paper covers an analysis of deer census and hunting take data collected in 8 Lake States National Forests during the years 1934-37 inclusive. These studies indicate the practicability of deer censuses by the drive method and hunting checks under certain conditions and the reliability of the methods in determining hunting pressure and population trends. Analysis of the drive method taken on representative areas indicates that discrepancies may occur due in part to faulty organization of the drives, although from year to year fluctuations may occur in the distribution of deer occasioned by seasonal movements, poaching, fires, and logging. The browse on many of the national forests has either reached maximum abundance or is in the process of being depleted by the natural succession. Under virgin forest conditions, little browse was produced. Upon completion of lumbering activities, the food of deer increased tremendously and the deer population responded accordingly. From the analysis of population and browse inventories, it is evident that in many instances the deer herds have reached their maximum abundance. Checks indicate that the success ratio of deer hunters has remained about the same during the last four years although the hunting pressure has increased over one hundred percent. About one hunter in three is successful in taking a deer."

Management: White-tailed deer

Olson, Herman F. Deer tagging and population studies in Minnesota, pp. 280-286, 7 tables.

Author's abstract: "The paper deals with studies made on the Superior National Forest, including the results of deer censuses, hunting checks, winter mortality, and deer tagging, during the past three years. The author concluded that in general heavier hunting is desirable and possible, although studies have not reached the stage where allowable take or carrying capacity can be stated in terms of numbers of animals. The return of tagged deer during the hunting season serves as a check on the deer census method of determining populations. Information is presented on the average dressed weight of deer by sex and age classes, as well as the causes of death in winter deer yards, and the sex and age classes among which winter losses occur."

Management: Wildlife in land planning

Bode, I. T., Seth Gordon, and H. L. Shantz. How best to plan for wildlife in land management, pp. 16-25.

Shantz. About 1 acre in 11 in the United States is now in national forests. There are 349 State game refuges, 31 Federal refuges, and 120 other areas set aside in the special interests of wildlife. They total some 29 million acres. A regulation of the Secretary of Agriculture authorizes the forester to close to trespass any area vital to the preservation of threatened species. Under this proviso a sanctuary for the California condor has been provided in the Los Padros National Forest. The forests must be managed on a land-planning basis and the principle of multiple use, including management for wildlife, reasonably applied. The winter range problem is the most pressing and about 9 million acres of additional winter range, adequately managed, are needed to serve the big game animals now present on the national forests. Twenty-five million acres would be required to balance maximum summer range capacity. Over-crowding exists in a number of localities and regulated hunting of both sexes is recognized as the only feasible remedy for these concentrations. Notes on beaver transplanting, encouragement of aquatic and upland game birds, and on cooperative undertakings.

Bode. Conservation is not solely a Federal and State function but to succeed must be applied on private lands by their owners or occupants. To have wildlife management widely adopted we must show that it will fit into regularly accepted systems of land use and land practice. We must also show the individual land-owner just how desired results may be obtained--a thing that still requires a great deal of finding out--the job of wildlife research stations.

Gordon. The problems on public and on private lands are very different, but in either case should be based on thorough research, which is no sooner begun than it involves application. Discussion of the Pennsylvania farm game and small refuge program. What the landowners want above all is respect for their rights and protection for their property. "The biggest job, after you have done the cover and food improvement work, is managing the human relations problems or regulating the take so as not to overshoot your annual production."

Pollution

Wolman, Abel, David Stroop, and Richard H. Pough. How shall we approach the pollution problem?, pp. 67-74.

Investigation and cooperative and legally obligated control discussed by proponents of each plan, together with discussion by several speakers, more of the do-something-now school.

Predation: In relation to carrying capacity

Errington, Paul L., and H. L. Stoddard. Modifications in predation theory suggested by ecological studies of the bobwhite quail, pp. 736-740.

In Georgia and Florida, predators apparently did, while in Wisconsin and Iowa they did not, reduce prey populations below the carrying capacity of the environment. It appears that lower predator densities in the Southeast may exert more severe pressure upon bobwhite populations than do equivalent or even higher predator densities in the northern Mississippi Valley. A suggested ex-

planation is fluctuations in the cotton rat population in the South are accompanied by oscillations in numbers of predators, which result in abnormal predation on bobwhites when cotton rats are scarce. By contrast, buffer and prey populations seem to be more stabilized in the northern area. Bibliography of 9 titles.

Predation: On upland game birds, South Dakota

Boed, Watson E. Do fur bearers affect upland game birds in winter?, pp. 508-510.

Author's abstract: "This study was made on the Waubay Migratory Waterfowl Refuge, Day County, S. Dak., during the winter of 1936-37 and November and December, 1937. The species of fur-bearers found included the coyote, the badger, the mink, the skunk, the raccoon, the weasel, and the feral house cat. Their relative abundance and their food habits as ascertained by field studies and stomach examinations are discussed. Climatic conditions during the study were recorded and the effects of the extreme cold and large amount of snow on upland game birds, fur-bearers, and on food and cover conditions for these animals were compiled. Four species of upland game birds, ring-necked pheasant, prairie chicken, European partridge, and sharp-tailed grouse were present during the study. The effects of the different species of fur-bearers on these birds as shown by the study are given. A discussion is made of the relationships of rodents to predation by fur-bearers on upland game birds, such as the evident buffer effects on jack rabbits, cottontails, meadow mice, white-footed mice, and domestic fowls between the coyote and upland game birds. Based on conditions during the study, the conclusion would be that the fur-bearers studied have little effect on upland game birds during winter."

Predation: On valley quail

Horn, E. E. Factors in nesting losses of the California valley quail, pp. 741-746.

Ranges and characteristics of California quail are described. Almost unbelievable early abundance of the valley quail was rapidly reduced by hunting, especially for the market. In seeking to improve conditions, vermin control was popularly adopted. No attempts to regulate the annual take were made. The factual basis for management was lacking and the investigation here reported upon was undertaken to remedy the deficiency, at least in part. There is a discussion of poisoning campaigns for the control of ground squirrels and other rodents in relation to game bird populations. With strychnine as the agent, no losses were noted; with thallium, even if a few quail are killed, the loss is more than offset by the reduction in squirrels, the principal quail-nest destroyers. Fluctuations in food supply by seasons or due to drouth are discussed and the importance of rodents as competitors for quail food pointed out. Investigation and experiment showed that ground squirrels play a serious part in causing nesting losses and that squirrel-control measures may be of value as a management measure. Other predators also are mentioned. A great increase in quail accompanied ground squirrel reduction in 1936, but in 1937 with squirrels and other predators in no greater numbers, the quail population

very materially decreased. This change is accepted as an example of the little understood phenomenon of population fluctuation. [May not the previous increase also be so interpreted?]

Predation: On white-tailed deer

Aiton, John F. Relationship of predators to whitetail deer in Glacier National Park, M. 302-304, 2 tables.

Tabulation of evidence as to cause of death of 240 deer. 138 or 57.5 percent were found not to have been killed by coyotes. "The small percentage of losses attributable to predators in comparison to the large percentage due to other causes definitely puts the predator problem in a secondary status." One of the tables shows counted and estimated numbers of mountain lions, wolves, coyotes, and deer for 5 years. "The over-crowding of the winter range of the whitetail deer, resulting in an inferior and decreased forage supply, presents a problem of primary importance."

Predators: Fire ants

Travis, Bernard V. Fire ant problem in the Southeast with special reference to quail, pp. 705-708.

Author's abstract: "Fire ants (Solenopsis geminata) cause serious losses among quail in the southeastern States. By attacking the eggs as soon as they are pipped or the chicks when they hatch, these insects destroy from about 4 to 16% of the young birds each year. The ants also inflict considerable damage to young citrus trees by eating the bark; and are a source of great annoyance as household pests, and to workers in fields. Studies to determine methods of control of the ants have shown that about 50 percent of the colonies can be rendered inactive by the application of dry sodium cyanide. Other fumigants, namely, chloropicrin, sulfur dioxide, and carbon disulfide are more efficient than cyanide, but their high cost does not warrant their general use. Due to the ability of the ants to detect minute quantities of insecticides or toxic substances in attractive baits, attempts to control them by this method have not yielded very promising results."

Predators: Identification by their work

Darrow, Robert. Possibilities of recognizing the evidence of predation and the species involved in the remains of grouse and grouse nests found destroyed, pp. 834-838.

Conclusions from study of 830 nests, 51 chicks, and 689 adults destroyed by predators and from observations on captive wild-trapped mammals and birds of 21 species. Experiments were made with eggs of grouse and with young pheasants. Characteristics of the treatment of both types of food by a variety of predators are described. The evidences of predation permit identifications of predators that are very accurate with respect to nests and fairly so for freshly killed birds.

Propagation: Wild turkey

Handley, C. O. Recent progress in wild turkey propagation in Virginia, pp. 847-851.

Reviews briefly the history of attempts at wild turkey propagation in Virginia and elsewhere, which in most cases resulted in the production of birds unable to support themselves when liberated and consequently worthless for restocking purposes. A plan, not new it proved, but independently worked out, was to mate captive-reared wild turkey hens to native wild gobblers; to follow modern commercial poultry methods in incubating the eggs and raising the poults; to confine the poults to be released in small pens during the juvenile molt; and to allow those to be kept as brood stock the run of large enclosures. "On the one hand, the wild instinct necessary in wild turkeys reared for release can be kept alive and even intensified by keeping the birds in small enclosures; on the other hand, the domestication of brood stock to be kept in captivity may be obtained to a desired degree by wing-clipping the birds, which, incidentally, does not interfere in any way with their mating, and giving them the freedom of a sizable yard. x x x restraint against the will produces fear, and freedom from restraint produces confidence. Recognition of these two factors, and their practical employment, we feel, is the key to success in the artificial propagation of the wild turkey."

Research: Browse preferences

Deem, J. L. Methods of studying browse preferences of deer, pp. 256-260.

Discussion of methods tried: Stalking (unsuccessful), observation from elevated platforms (unsatisfactory as to detail, but yielded valuable general information), stomach analysis (used as a check on other work rather than as a primary source of data), measurement of browsing on sample plots (gave the most exact information obtained during the study). Description of methods used in measuring and tallying evidences of browsing. Central Pennsylvania.

Research: Food habits

Cottam, Clarence, and A. L. Nelson. Why study the food of fur animals?, pp. 527-530.

Food habits studies are fundamentally important to accurate determination of the inter-relationships of the varied forms of wildlife and to learning their full significance to man. Relation of investigations of the subsistence of fur animals to the "vermin" question and to other control problems, and to management especially in maintaining necessary food supplies.

Research: Fluctuations

Skiff, J. Victor. The reported take of game as an index to population fluctuations, pp. 576-582, 3 figs.

Author's abstract: "An analysis of the value of mandatory annual reports from St te sportsmen's licenses covering the take of game, as an index to population fluctuations, based upon a compilation of such State-wide reports for a 17-year period in New York. Those reports covering 16 species of game have been reduced to a take-per-license basis, corrected for variables and plotted as line graphs which clearly show yearly and what may be cyclic fluctuations. The mechanical difficulties of the system, the limitations thereof, and the cost are discussed as a part of the analysis. Refinements of the New York method are suggested as a means of evolving a more perfect one for States wishing to inaugurate this method of determining population fluctuations, as an aid in administration and management.

Research: Identifying tooth marks

Pearce, John. Identifying tooth marks of some northeastern animals on forest vegetation, pp. 690-694, 1 table.

Author's abstract: This discussion deals only with the forest mammals of the northeast. It is a practical contribution to aid those not having made a detailed study of animal work who may be required at any time to identify wildlife feeding in the woods. Since under normal conditions the most significant forest growth is that of woody plants, feeding on these is used as the basis of comparison. It will be noted that reference to animal 'damage' or 'injury' is avoided; this is to correct the widespread idea that all such feeding is necessarily damaging to the forest as a whole. Much of the confusion observed in field classification of wildlife feeding is actually quite needless. No involved technical skill--not even a hand lens--is needed to identify the great majority of all mammal feeding on woody plants. Only three simple essentials are required. These are careful observation, some knowledge of the species likely to be found in the locality, and finally a clear idea of the relative tooth sizes and feeding procedures of these animals.

"Tooth marks are nearly all left by two readily separated groups, the rodents (including Lagomorphs) which cut or gnaw their food and the browsing forms which break it off. This fundamental difference is due to the lack of incisor teeth among deer, moose, and elk, and presence of effective upper and lower incisors among the rodents. Among the latter group separations can usually be made to species at a glance but the actual feeding of browsing game and domesticated cattle in the east is usually inseparable, on the basis of twigs alone. However, other factors can be brought into play in most cases; these are discussed to some extent. In general, rodents leave smoothly cut, slanting or conical stubs, while the deer group leaves roughly broken, shredded ends approximately square across. Marks left by bears also are discussed. Rodent's tooth marks are separated by the width of the channels left gouged or impressed in wood and bark. The measurements need seldom be taken. A table is presented, however, showing the range of width of incisors and of the marks made by them for 5 common mammals. Actually, mice, squirrels, rabbits, porcupine, and beaver all have their own band of average sizes which do not overlap enough for confusion. Once these are understood, the individual identification may be approached with confidence in the northeast."

Research: Need of on mammals

Hamilton, W. J., Jr. Research needs in mammalogy, pp. 695-698.

It is axiomatic that pure research of today is of practical value tomorrow. Life-history and population studies of mammals are needed as a basis for management and may throw light on general biological phenomena. Numerous suggestions are made as to wanted research.

Research: Need and value of

Leopold, Aldo, Walter P. Taylor, Rudolf Bennitt, and H. H. Chapman. Wildlife research--is it a practical and necessary basis for management?, pp. 42-55.

Leopold. "For the moment we are, for the most part, ecologists rather than managers"--that is, research immediately disclosed our ignorance of fundamentals and detoured earnest students away from management. Apparent management of cyclic species looks well during the upswing but we know little about cycles and nothing as to their control. Simple food and cover improvement and regulation of the kill have invariably increased pheasant populations to high levels. Research has done away with many faulty beliefs as to game species, a process that still is in need of extension to the average sportsman. Carrying capacity studies have brought back to attention a truth that every pioneer sees but refuses to believe, namely, the simultaneous abundance of both predators and prey.

[Comment. Leopold's presentation seems somewhat deprecatory. "What is the cycle x x x We don't know." Cycles have been going on indefinitely; previous regimes have not solved them and there is no exclusive responsibility upon present wildlife researchers to do so. Perhaps they are among the immutable phenomena of Nature that simply must be accepted. "Research has made few discoveries of workable technique." Again wildlife research could hardly be expected at once to transform wildlife management. What we think of as new things come about as a rule, not by abrupt creation but by modification of previous concepts or entities. Management of sorts there has been for ages, and it must go on although empirically, while research is being done to improve it. And it has been improved (or at least its possibilities have been) by every piece of pertinent research. Where the pontifical behavior noted by Leopold prevails is unknown to the abstracter but it can hardly exceed the bland presumptions of the preceding school. It seems to the commenter that there is a healthy realization of ignorance and a general willingness to cooperate in the improvement of knowledge.]

Taylor. Gives several examples of the findings of wildlife research and of their application. One concerns jack rabbits, rodents, and grasshoppers, which up to a certain point, increase directly as overgrazing increases. Conservative grazing is indicated as a control measure. Jack rabbit numbers have a more or less definite relationship to those of prairie chickens in coastal Texas. They can be readily ascertained and furnish a definite means of estimating the value of land for the prairie chickens. Other instances pertain to findings as to the food habits of armadillos in relation to quail, methods of

counting squirrels, prairie chickens, and bobwhites, stages in woodland succession most favorable to quail, and usefulness of blue jays in making acorns available to those birds.

Bennitt. Wildlife research is not only necessary but must be done by highly-trained investigators, for fundamental causes do not appear on the surface for everyone to see. Painstaking work requires time, so patience must be exercised. Results cannot be guaranteed and they may upset previous notions. There is opportunity, however, for popular cooperation in research, and seeking help of the public is a good way to combat prejudices against research.

Chapman. Man should unemotionally seek to understand what is best in the long run for himself and for the environment, including wildlife, and govern his actions accordingly. The questions to which he must have answers to do this well can be solved only by research such as has been done for agriculture, horticulture, and all forms of industry. Intelligent action must supplant emotion, prejudice, and rules of thumb in wildlife management.

Research: Primeness of fur

Ashbrook, Frank G. Preventing wastes of fur trapping when pelts are not prime, pp. 511-514.

Discussion of how primeness may be recognized, especially in muskrat pelts. Summary of a microscopical study of the subject by Professor Charles K. Gunn of the University of Manitoba.

Research: Reproductive cycle of fur animals

Enders, Robert K. Fur animal reproductive cycles and their relation to management, pp. 515-517.

The reproductive cycle or rut, oestrus, and breeding activity, includes not only the breeding season, but the whole complex series of changes involved in preparation for, and following breeding. Accurate information in this field is lacking for most wild mammals, yet is necessary to their proper management. Sketch of what is known and suggestions for research.

Weights and measurements: Northern white-tailed deer

Park, Barry C. Deer weights and measurements on the Allegheny National Forest, pp. 261-279, 1 photo, 7 graphs, 4 tables.

Description of the forest, which is in a well-populated district, and is mostly cut-over and burned-over land. Most of the second growth is less than 40 years old. The deer herd is estimated at 43,000 animals--1 to 17 acres. Proper stocking would be one animal to 40-50 acres. Overbrowsing is evident and it has materially affected reforestation. Deer damage on plantations runs as high as 94 percent. The buck law has been in effect on the area for some 30 years. The sex ratio, including fawns, was 1:5-6, excluding fawns, 1:11. Sportsmen believed the deer were becoming smaller every year. The report is

upon 3 of 5 proposed years of study. The technique of the field work is described; tables give the allowance for viscera in making estimates from dressed carcasses (averaging 20 percent), proportion of the samples to the entire kill, and percentage of successful hunters (averaging 11.8). Weight increases with age up to 9-1/2 years. A close relationship exists between weight and acres per deer. Fawns on overstocked areas are not permanently stunted during the first winter but suffer heavier losses than elsewhere. Average weights are given for sex and age classes; this factor alone is not considered a true indicator of the physical condition of the herd. There is some correlation between antler measurements and weight. Body measurements appear to be more reliable indicators of age than are antler measurements. The average number of tines on antlers is a poor index of age. Reduction of the herd is necessary to stabilize it at a level consistent with the winter food supply. Bibliography of 8 titles.

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